THE IRON TRADE REVIEW

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STEEL RAIL BUYING

WILL START WITH LARGE ORDERS FROM THE PENNSY.

Blast Furnace Production Increases Slowly—Cast Iron Pipe Interests Buy Pig Iron—Close of Iron Ore Shipments.

Positive announcement that the Pennsylvania railroad will place an order for 160,000 tons of steel rails within a few days is believed to indicate that a general buying movement on the part of the railroads will soon be started. At present, however, the market is rather quiet in both pig iron and finished products. Rumors of advances in prices of steel products are without foundation.

Pig Iron Conditions

The principal activity in the pig iron market has been confined to buying by cast iron pipe interests, about 25,000 tons having been taken by the leading interest, while other concerns are understood to have placed orders for good tonnages. While the pig iron market is dull, prices are firm and there is no indication of weakness. Southern charcoal iron is now quoted on the basis of $21 Birmingham, an advance of $1 per ton. An advance in the price of Jackson silveries is probable.

Blast Furnace Output

Blast furnace production during November was at the rate of 52,744 tons daily, compared with 50,764 tons in October. As November had only 30 days, the actual gain in production was only 8,490 tons.

Iron Ore Statistics

Iron ore shipments for the season make a better showing than was anticipated, the total to Dec. 1 being 25,345,168 tons, a decrease of 15,849,771 tons compared with last year. Shipments for December will amount to about 82,000 tons. Earlier in the year it was expected that the decrease for the season would be about 50 per cent, while the final figures will show a decrease of about 38 per cent.

Railroad Buying

Heavy buying of track fastenings by the railroads continues, orders for about 150,000 kegs of spikes and bolts having been placed during the week. The American Car & Foundry Co. has received an order from the Harriman lines for 1,871 freight cars, which is in addition to orders for 5,200 cars placed with various interests some time ago. The Canadian Northern has ordered 1,750 box cars, and a number of small orders for cars are reported. Very few orders for bridges are being placed by the railroads. The Rock Island has indicated that its order for rails will be about 50,000 tons.

Structural Material

The general contract for building the Chicago city hall has been awarded to the Noel Construction Co., of Baltimore, and about 11,000 tons of steel will be required. Important building projects in New York City include an addition to the Whitehall building, which will call for 15,000 to 18,000 tons of steel; the municipal building, 25,000 tons, and the post office building at Thirty-fourth street. Many small structural contracts have been awarded.

Wire and Tin Plate

With the exception of November, 1906, the past month was the heaviest in orders ever recorded by the American Steel & Wire Co. December also promises to make a good record, especially in wire nails and fence material. Specifications on tin plate are commencing to come in from the can manufacturers. About 4,000,000 cases of salmon are packed on the Pacific coast each year, requiring 20,000 tons of tin plate for the cans. Next year is expected to be above the average, insuring a very active tin plate demand on the Pacific coast during the coming season.

Coke and Old Material

Several furnaces have made contracts for their coke requirements for the first half of next year, one being for 30,000 tons, and another for 60,000 tons. There is some indication of softening in the old material market, but prices have not yet declined.

LARGE RAIL ORDER

About to be Placed.—Iron Making at Gary Begins with New Year.

(Special Telegram.)

New York, Dec. 9.—Positive announcement is made that the Penna. R. R. will place next year's rail order within a few days, probably this week. It will call for about 160,000 tons, comparing favorably with the 1907 order. There is no announcement as to price or specifications.

Official denials are given to the rumor of prospective steel prices advances.

Business is quiet but firm pending decision as to new tariff rates.

There is better buying of foundry and forge iron. One local house Tuesday booked 2,500 tons. Total sales of iron in eastern territory for the week amounted to about 25,000 tons.

Either one or two blast furnaces at Gary will start before Jan. 1 to provide gas power. It will be impossible to operate any steel capacity before April.

Warren Eden Hill, president of the Continental Iron Works, died Dec. 3, aged 73. He had been associated with this company since 1857 and designed the machinery for the Monitor of Ericson.

The leading interest's rail sales include Port Clinton Short Line, 3,100; Wheeling & Lake Erie, 3,300; scattering, 3,500.

THE WEEK IN IRON CENTERS

PITTSBURG.

Pig Iron Market Quiet—Rail Orders Soon are Probable.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Dec. 8.

December, normally a relatively light month in industrial activity, is following precedent in the general iron and steel situation, but makers are looking beyond to the new year and are awaiting substantial developments, with some show of reasonable optimism. Energies among consumers are now being devoted to rounding out the year's business in an orderly fashion and, with some classes of trade, there is a disposition to proceed slowly with the filing of specifications for delivery in the present period.

In the absence of any definite official announcements, the market is in an expectant attitude relative to the inauguration of steel rail buying and reports are current that negotiations have reached the stage where some conclusive action on the part of the railroads is imminent. Once a general disposition is manifested by the railroads to contract freely for their future needs in iron and steel, it is believed a notable advance will have been made toward the recovery of a full demand for the products of the market and that conditions will be materialy promoted.

Increase is being shown in billet and semi-finished steel consumption and manufacturers are enlarging their mill activities in accordance. The Carnegie Steel Co. now has 31 of its 55 blast furnaces in operation, which is the largest number active at any time during the business depression. Two additional furnaces have just been blown in at the Mingo plant, No. 2 on Dec. 5 and No. 4 on Dec. 7. The Mingo steel works, which has been idle for about a year, will resume shortly, its principal products being billets and sheet bars, and this will increase the company's going finishing capacity to approximately 60 per cent.

Pig Iron.—A general quietness has settled down upon the pig iron market and current business is expressing itself in relatively small tonnages after the brisk buying throughout November. The melters, having closed for a fair proportion of their requirements over the near future, are apparently willing to let the market take its own course for a while before again becoming buyers, generally. The furnaces, too, are in a more comfortable position and present a firm attitude on present prices.

The foundry iron market is ruling from $15.50 to $16.00 valley furnace, but the lower quotation is not prevalent. We note the sale of 600 tons of No. 2 at $16.50 delivered Pittsburg or $15.60 valley basis, but the iron did not come from the valleys. Sales have been made at various prices from $15.50 up, but the furnaces generally are avoiding the minimum. No. 1 foundry has sold as high as $16.50 furnace. All transactions are small. In northern forge, one melter has taken out about 5,000 tons at prices ranging around $15.25 delivered Pittsburg.

The prevailing open quotation on basic is about $15.75 valley, although this price can be shaded in some quarters. A sale of 600 tons for first quarter is reported at $15.50 valley. We quote the market at from $15.50 to $16 valley, some furnaces announcing their unwillingness to take on any business at less than the higher level. Bessemer is held from $16.50 to $17, but sales are light and largely for spot shipment. One maker declined an offer of $16.50 valley on 1,000 tons for prompt shipment Some small sales are reported at $17. There is a wide spread in malleable. A several hundred ton lot went below $15.75 valley while some sellers have put through deals at better than $16 valley. We quote the market at from $15.75 to $16.25 valley.

The southern situation shows increasing strength. One large maker, having made large sales over the past six weeks, has withdrawn all quotations below No. 2. On prompt and first quarter delivery on northern iron, we quote as follows:

Bessemer, valley	$16.50 to 17.00
Bessemer, Pittsburg	17.40 to 17.90
No. 1 foundry, Pittsburg	16.90 to 17.40
No. 2 foundry, Pittsburg	16.25 to 16.90
Gray forge, Pittsburg	15.40 to 15.90
Basic, valley	15.50 to 16.00
Basic, Pittsburg	16.40 to 16.90

Ferro-Alloys.—Several transactions of note in ferro-manganese have recently been closed, and prices are stronger. A local steel company, a large consumer of ferro-manganese, closed this week for 1,000 tons for four months at about $44 delivered. A far western interest also took 1,200 tons for prompt and first half. A sale of 150 tons for second and third quarter brought $45 Baltimore. The ferro-silicon market, particularly as to the lower grades, is improved. We quote 80 per cent ferro-manganese at $44 to $45 Baltimore with a freight rate of $1.95 to Pittsburg.

Imported 50 per cent ferro-silicon is quoted $64 Pittsburg on forward deliveries; domestic 12 per cent, $28; 11 per cent, $27; 10 per cent, $26, Pittsburg. Imported lower grades of ferro-silicon range lower than domestic.

Plates.—The Harriman railway interests this week awarded a contract to the American Car & Foundry Co. for 1,870 freight cars with steel underframes, completing their full inquiry for 7,000 freight cars, of which about 5,200 were placed with various companies several months ago. The steel will be furnished by the Jones & Laughlin Steel Co., and the axles will likely go to the Carnegie Steel Co. Though the contract for 1,500 all steel hopper cars from the Virginian railway has not been formally placed, it is understood the Pressed Steel Car Co., Pittsburg, will fill the order. The locomotive order recently placed by the United States Steel Corporation with the American Locomotive Co. and Baldwin Locomotive works includes 21 engines for the Bessemer & Lake Erie railroad and 15 engines for the Union railroad. Improved specifications on plates are being received by the mills from the boat and steel car builders. Some shading of prices on the lighter gages is still in evidence. Official prices are as follows:

Tank plate, ¼-inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds: Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches, excepting straight taper plates varying not more than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in widths over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1c. Gages under ½-inch to and including 3-16-inch plate on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—Considerable contracting for future requirements is under way but specifications are only fair and little tonnage is being taken beyond ac-

tual present needs. The stove manufacturers are buying in a good volume for reasonably prompt delivery. There is some demand for corrugated sheets for roofing and siding purposes, and inquiries are out for 55 tons for this district and about 160 tons to go west. Sheet makers are now working their plants largely upon anticipated shipments which will go forward soon. Price shading is not general. The leading sheet manufacturer is operating 95 mills, or 56 per cent of capacity, this week, having started operations at its Canal Dover plant of 11 mills. The Allegheny Steel Co. is working its nine mills part time. We quote official prices as follows:

Blue annealed sheets, No. 10 and heavier, 1.80c; Nos. 11 and 12, 1.85c; Nos. 13 and 14, 1.90c; Nos. 15 and 16, 2c; box annealed, Nos. 17 to 21, 2.25c; Nos. 22 to 24, 2.30c; Nos. 25 and 26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.60c; No. 30, 2.70c; galvanized sheets, Nos. 10 and 11, 2.45c; Nos. 12 and 14, 2.55c; Nos. 15 and 16, 2.65c; Nos. 17 to 21, 2.80c; Nos. 22 and 24, 2.95c; Nos. 25 and 26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.70c; No. 30, 3.95c; corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation, and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Jobbers are allowed $1 a ton from these prices.

Tin Plate.—While the requirements of the salmon packers are now well under contract, it is believed that shipments which usually follow after Jan. 1 will be somewhat delayed this year owing to unsettled labor conditions on the Pacific coast. The year in tin plate, which has been a very favorable one, is being rounded out in a manner quite satisfactory to manufacturers. The American Sheet & Tin Plate Co. this week resumed operations at its National plant of 25 mills and is now working 136 mills or 56 per cent of capacity. We quote official prices:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—No important rail contracts for 1909 delivery have yet been announced, but rail makers profess themselves to be much encouraged over the outlook and definite developments are believed to be close at hand. The Carnegie Steel Co. took about 1,500 tons of light rails the past week and is receiving better specifications on contracts for standard sections. The rail mills at the Edgar Thomson works are running on slightly improved schedules. Rerollers continue to underquote official prices on light rails, and this competition is being met by the mills rolling from billets. On present specifications on Bessemer rails, we quote as follows, the base price for open-hearth rails being $30 mill:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28; angle splice bars for standard sections, $1.65; standard spikes, $1.70 to $1.80 Pittsburg; hand spikes, $1.80 to $1.90 Pittsburg.

Steel.—Billet contracts governed by a sliding scale arrangement are being more heavily specified against. The month of November was notable in this respect, and a large increase in tonnage was added to mill orders. New billet business is light, and some makers are not aggressive in booking additional tonnage. Sheet and tin bars are also showing some improvement.

Bessemer and open-hearth billets, base sizes, are quoted at $25 Pittsburg, and forging billets at $27 Pittsburg, subject to the division of the freight charge over $1 and not exceeding $3, and sheet and tin bars at $27.50 Pittsburg, valley and Wheeling territory, and $27 Pittsburg for delivery to other points.

Hoops and Bands.—None of the large hoop consumers has yet entered the market for next year's requirements, but, as contracts are near expiration, buying is expected soon. Owing to the effective temperance crusades in some sections, it is likely that there will be a notable decrease in required tonnage. We quote official prices:

Hoops in carload lots, 1.80c; in less than carload lots, 1.90c; bands, 1.40c, base half extras as per standard steel.

Merchant Bars.—The stiffening tendency in bar iron prices continues, owing to the high level of scrap. Good sized contracts have been booked this week in outside territory at the full Pittsburg base price, which was recently raised. There has been some encouraging buying by railroads and considerable tonnage is going to car repair purposes. Steel bar specifications are slightly better, and Pittsburg district consumers are taking out a little more tonnage. The reinforcing bar trade is showing activity owing to a desire to rush building work before unfavorable weather conditions set in. The rerolling mills are quite aggressive in their quest for business, and in the bedstead angle market such prices have been named that the makers from steel are disposed not to quote at all in some cases. Recent sales of all pig muck bar have been made as high as $28.50 Pittsburg, the advance being due to the higher price of gray forge iron. We quote official prices as follows:

Common iron bars, 1.50c Pittsburg in carload lots and over; 1.55c in less than carloads; 1.42c to 1.45c base Pittsburg, plus freight to point of shipment on western deliveries; Bessemer and open-hearth steel bars, 1.40c; plow and cultivator, 1.40c; channels, angles, zees, tees, under 3 inch, 1.50c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 57 per cent in car loads, and 52 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.60c base. Iron finished tire under 1½ by ½ inches, 1.55c, plus ½ extra on tire card; iron finished tire, 1½ by ½ and over, 1.40c; plus ½ extra on the steel bar card.

On cold rolled strip steel, width 1½ inches and wider, and 0.100 inch and thicker, we quote base prices per 100 pounds, $3.35 on hard, and $3.60 on soft.

Structural Material.—The shape mills are receiving better specifications from work recently placed under contract. Requirement inquiries by the railroads for tonnages for repair work are coming out very slowly, although that of the Delaware & Lackawanna calling for a small amount is now in the market. Industrial projects are furnishing most of the current business. Bids on the new plant of the Crane Co., Chicago, at Oakmont, this city, which will require 600 tons, will go in next week. The T. C. Jenkins estate is planning the erection of a 12-story business building in this city, of which only five stories requiring several hundred tons will likely be erected at this time. Fabricating prices are slow to improve. We quote official prices as follows:

Beams and channels, 15-inch and under, 1.60c; over 15 inches, 1.70c; zees, 1.60c; tees, 1.65c; angles from 3 to 6 inches, 1.60c; over 6 inches, 1.70c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Merchant Pipe.—The demand in merchant pipe is being well maintained, although the market is less lively owing to the year-end season. Inquiries are out for 10 miles of from 2 to 12-inch heavy iron line pipe for coal mine

operations, and four miles of 2-inch tubing for Texas. Spang, Chalfant & Co., Inc., this week started operation in their new bar mill at their Etna works, and will start their new puddle mill the latter part of this month. We quote the following official base discounts, with an additional one point and five off to jobbers:

	—Steel—		—Iron—	
	Black.	Galv.	Black.	Galv.
¼ to 6 inches....	75	65	73	63

Boiler Tubes.—Though the merchant tube market is not active, it is doing as well as may be expected under prevailing conditions of limited new plant construction. The locomotive tube market is a little more active, and most of the current purchases by the railroads are being used in repair work. We quote the following official base discounts to the general trade on base sizes:

BOILER TUBES.

	Iron.	Steel.
2¼ to 5 inches.....	52	65

Wire Products.—The month of November proved to be an excellent one in the orders for plain wire received from the manufacturing trade. With some large wire interests, the past month in this respect was the best of the current year. The general market is running along smoothly with a firm undertone, which is interpreted as being favorable to active spring business. Much wire nail activity is not expected before February. Official prices on wire products are as follows:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c.

Wire Rods.—Several inquiries from brokers and middle men for tonnages of Bessemer and open-hearth rods for delivery over the first quarter and half are in the market. We quote $33 Pittsburg on Bessemer and $34 Pittsburg on open-hearth rods.

Coke.—Several additional furnace interests closed in the week for their requirements over the first half, one for 30,000 tons and another for 60,000 tons at prices of $2 and slightly better than $2 respectively. Rainfall in the operating regions during the week partially improved the drouth conditions existing there, and companies are more encouraged over the water situation. However, short schedules are still necessary in some works, and several others ready to resume are unable to do so, because of lack of water. There is little danger of any shortage of coke in any event, as a number of plants which have water are not operating under present market conditions. We quote standard furnace coke at from $1.90 to $2.10 ovens for first half, and from $1.75 to $1.85 for spot. Some foundry contracts up to July are being taken at $2.40 and we quote the forward market on standard foundry coke at from $2.25 to $2.50 ovens, with spot coke ranging from $2.10 to $2.35 ovens. For the week ending Nov. 28, the *Courier* shows 19,829 ovens active, 18,191 ovens inactive with an output of 229,199 tons as compared with 19,154 ovens active, 18,866 ovens inactive with an output of 220,145 tons the previous week.

Old Material.—The old material market has shown little change in the past week and prices are practically stationary. Some of the steel companies, including the Pittsburg Steel Co., Allegheny Steel Co. and others, are understood to be favorably situated with respect to scrap accumulated against future needs, but others are keeping out of the present market as best they can. Small sales of cast scrap are reported in this territory on a basis of about $15 Pittsburg. We quote gross tons delivered in the Pittsburg district as follows:

Heavy melting scrap, $16 to $16.50; re-rolling rails, $17.25 to $17.75; bundled sheet scrap, $13.50 to $14; iron axles, $23 to $23.50; old iron rails, $18.50 to $19; No. 1 wrought scrap, $17.25 to $17.75; old car wheels, $16.25 to $16.75; low phosphorus, $18.50 to $19; machine shop turnings, $11.50 to $12; cast borings, $10.75 to $11.25; No. 1 cast scrap, $14 to $14.50; malleable, $14.25 to $14.75.

CHICAGO.

Heavy Buying of Track Fastenings—Pig Iron Quiet and Firm.

Office of THE IRON TRADE REVIEW,
1328 Monadnock Block, Dec. 8.

The quietness that was generally anticipated for the remaining weeks of the year when inventory taking and the holidays are to be reckoned with was in evidence during the week under review. In many directions may be found a disposition to defer contracting until after Jan. 1, and in some instances requests are being made for the delay of shipments on contracts until after that time, presumably to diminish the burdens of inventory. From the standpoint of volume, the contracting for spike and bolt requirements was again a very interesting feature, about 150,000 kegs having been placed with the leading interest. The business recently placed will provide for the capacity of the mills for the next six months on bolts and at least three months on spikes. No further developments have come to light with regard to rail purchases, but an intimation of the extent of the Rock Island railroad purchases places the tonnage at from 40,000 to 50,000 tons, although the matter will not be taken up until after the first of the year. The Grand Trunk is in the market for 50 locomotives; the Iowa & Omaha Short Line is to buy 12 locomotives; the St. Louis & Southwestern has increased its order to the Baldwin Locomotive Works to 31 locomotives; the Canadian Northern has ordered 1,750 box cars from the Canada Car Co. and Rhodes, Curry & Co.; the Birmingham Southern has ordered 175 50-ton, all-steel dump cars and 26 50-ton all-steel gondolas from the Pressed Steel Car Co., and the Chicago, Rock Island & Pacific is preparing specifications for 70 passenger cars. A number of small structural steel contracts were placed, but the projects of leading interest remain unsettled. Steel bar specifications are very good and the wire trade is moving in almost record breaking volume, but iron bars, sheets, plates, and tubular goods are less active. The scrap market is about as it was a week ago, with perhaps a slightly lessened demand from consumers. Offerings of nearly 14,000 tons of scrap are submitted this week by four railroads. The pig iron market is comparatively quiet, but firm as to price. Most of the sales reported were 1,000 tons or under and owing to the disinterestedness of buyers at present the volume of trading was limited. The tariff question is one of common discussion.

Pig Iron.—Pig iron sales during the past week have been light. Some scattering orders for lots of less than 1,000 tons have been placed for both northern and southern iron, which are now about on a parity with regard to price in this city. A few sales are reported from Milwaukee, where the southern price of $17.75 is the basis. Two inquiries for 1,500 tons are pending, as are also an inquiry for 1,000 tons and one for 600 tons. The present outlook in this territory seems to indicate that a resumption of the buying movement can hardly be expected before Feb. 1, consumers being very generally provided for through the first quarter. With regard to price, both northern and southern furnaces are still asking the prices that have prevailed for the past few weeks with a display of considerable firmness. For deliveries through the first half, $13 apparently is the minimum price, with certain interests asking $13.50

Birmingham for other than first quarter delivery. Local furnaces are holding at a delivered price that will yield a minimum of $17 at the furnace. We quote for first quarter, delivered Chicago plants, as follows:

Lake Superior charcoal	$19.50
Northern foundry No. 1	18.00 to 18.50
Northern foundry No. 2	17.50 to 18.00
Northern foundry No. 3	17.00 to 17.50
Southern foundry No. 1	17.85 to 18.35
Southern foundry No. 2	17.35 to 17.85
Southern foundry No. 3	16.85 to 17.35
Southern foundry No. 4	16.35 to 16.85
Southern No. 1 soft	17.85 to 18.35
Southern No. 2 soft	17.35 to 17.85
Southern gray forge	15.60 to 16.10
Southern mottled	15.35 to 15.60
Southern silveries, 4 per cent silicon	18.10 to 18.60
Southern silveries, 5 per cent silicon	18.35 to 18.85
Southern silveries, 6 per cent silicon	18.85 to 19.35
Jackson Co. silveries, 6 per cent.	19.90
Jackson Co. silveries, 8 per cent.	20.40 to 20.90
Jackson Co. silveries, 10 per cent.	21.90
Malleable Bessemer	17.00 to 17.50
Standard Bessemer	17.65 to 18.15
Alabama Basic	17.35 to 17.85

Billets.—The activity of the past few weeks has placed a good tonnage of billet orders on the books, but new business has fallen off during the past week. Several carload lots of forging billets were disposed of and prices as reported show a considerable strength. We quote 4 x 4-inch rolling billets $26.50, and forging billets $28.50, base Chicago.

Merchant Steel.—With the exception of steel bars, specifications for which are reported as coming in at the rate of from 4,000 to 5,000 tons a week, the finished material market is only moderately active. However, the monthly report for November shows that it was in several instances the best month since the midsummer months of 1907. The East Chicago mill of the Interstate Iron & Steel Co. is running with somewhat increased orders, both trains are on at the Sylvan mills of the Republic Iron & Steel Co., three trains out of five at the Tudor mills are running and at the Inland mills two out of four. The new bar mill of the Inland Steel Co. is rapidly being brought to a condition of smooth running and its capacity for the period of breaking in is well taken care of. Jobbers have slackened up in their demands for material in order to go through December with light stocks. Prices are without change and we quote:

Bar iron, 1.50c to 1.53c; soft steel bars and bands, 1.58c, half extras; soft steel angles, less than 3 x 3, 1.68c; hoops, 1.98c base, full extras; planished or smooth-finished tire steel, 1.78c; iron finish, up to 1½ x ½-inch, 1.73c base tire card; iron finish, 1½ x ½-inch and larger, 1.58c base steel card; channel for solid rubber tire, ¾ to 1 inch, 2.08c; and 1⅛ inch and larger, 1.98c; smooth-finished machinery steel, 1.83c; flat sleigh shoe, 1.63c; concave and convex sleigh shoe, 1.83c; cutter shoe, 2.95c; toe calk steel, 2.13c; railway spring, 1.93c base steel card; vehicle spring steel, 1.98c base vehicle card; crucible tool sheet, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 56 per cent off the list for carload lots, and 52 per cent off for less than carload lots, carload freight allowed to points in base territory. On iron and steel bars from local stocks, we quote as follows: Bar iron, 1.90c to 2c, full extras; soft steel bars, 1.80c per 100 pounds base, plus half extras; soft steel hoops, 2.30c, full extras.

Plates.—The month of November presents a very encouraging record in the matter of plate tonnage. The large amount of car building resulted in orders whose aggregate exceeded that of any other month for 18 months past. These contracts were lumped together to a considerable extent and specifications followed practically at once. As a result, the December plate business has been quiet, but with the mills well supplied with tonnage. Prices are not too securely established and reports from the central west rumor a degree of weakness. We quote as follows:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.78c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2c to 2.10c; from 72 to 96 inches wide, 2.10c to 2.20c; 3/16-inch up to and including 60 inches wide, 2.10c to 2.15c; 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.10c to 2.15c. Flange and head quality, 25c extra.

Sheets.—The usual December lowering of stocks by the jobbers is responsible for a falling off in mill orders for sheets to a noticeable extent. Trade from store continues good and prices are firm. We quote store prices Chicago delivery. For mill prices see Pittsburg report.

No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; Nos. 18-20, 2.60c to 2.65c; Nos. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, No. 10 to 16, 3.05c to 3.10c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No. 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—While a number of contracts for the fabrication of structural steel were placed during the week, the total tonnage amounted to less than 8,000. The Ordway Hotel at St. Paul was let to A. Bolter & Sons, Chicago. Bethlehem shapes were specified and the tonnage was 1,500. The steel for the new foundry of the Featherstone Foundry & Machine Co., amounting to 800 tons, went to the Kenwood Bridge Co. The Virginia Bridge Co., Roanoke, Va., will supply 373 tons of steel for the First National Bank building of Houston, Tex. The general contractors are Jas. Stewart & Co., St. Louis. The Pennsylvania Steel Co. took the contract tor 200 tons of bridge structurals for a bridge over the Tensas river on the line of the Missouri Pacific. While the successful bidder has not yet been announced, it is understood that the contract for 1,736 tons for pier 38 at San Francisco has been let. The court house at Pueblo, Colo., in which will be 400 tons of steel, will be erected by the Des Moines Bridge & Iron Co. The contract for between 500 and 600 tons for the sanitary canal bridge was awarded to the Wisconsin Bridge & Iron Co. The South Halsted Street Iron Works secured the order for 350 tons of steel for a Chicago school house and the Minneapolis Steel & Machinery Co. will furnish 268 tons of steel for the Vermont building, Salt Lake City. Bids have been submitted on about 700 tons for a Chicago hospital. The American Bridge Co. will fabricate 150 tons of steel for a grandstand at the St. Louis baseball park of the American League and 100 tons for a gravel handling plant at Baton Rouge, La. The contracts for the viaducts in Denver and Kansas City are still unplaced. The prices at which contracts have been placed recently, while admitting of considerable improvement, show less eagerness to land every job on which figures are submitted. We quote as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.78c to 1.81c delivered Chicago. For extras see Pittsburg report. Quotations from store are as follows for carload lots and over:

All angles, 3 inches and larger, including 6 inches, $1.95 per 100 pounds; angles over 6 inches, $2.05 per 100 pounds, base; beams, 3 to 15 inches, inclusive, $1.95 per 100 pounds, base; channels, 3 inches and larger, $1.95 per 100 pounds, base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—The week of railroad buying was featured by still further contracting for spikes and bolts on a large scale and among the orders placed was that of the Missouri Pacific for 35,000 kegs of bolts, which is one of the largest single orders for bolts ever placed. In addition this same road ordered 35,000 kegs of spikes. The Northern Pacific contracted for 25,000 kegs of spikes and 7,000 kegs of bolts, and the Great Northern covered its requirements of spikes and bolts, amounting to about the same quantity, and also placed the order for its splice bars. The Wisconsin Central increased the order reported a week ago to 3,000 kegs of bolts and 4,000 kegs of spikes. Several thousand kegs were placed with the Soo Line. The contracts placed in the last few weeks will supply tonnage for a six months' run on bolts and about three months' run on spikes for the mills of the leading interest. No further inquiries for standard section rails have been received, but the Chicago, Rock Island & Pacific has made known that its probable requirements will be in the neighborhood of from 40,000 to 50,000 tons, which will not be placed until next year. Inquiry for light rails is very good and sales are very fair. We quote for Chicago delivery as follows:

Standard Bessemer rails, $28; open-hearth, $30, f. o. b. mill in 500-ton lots and over; less than 500 tons, $2 extra, full freight to destination; light rails, 25-pound to 45-pound, $26; 20-pound, $27; 16-pound, $28; 12-pound, $29. Track supplies, f. o. b. Joliet, angle bars, 1.50c to 1.60c; spikes, 1.80c to 1.90c; track bolts, with square nuts, 2.15c to 2.25c; with hexagon nuts, 2.30c to 2.40c. Small railroad and square boat spikes, 1.90c base, f. o. b. Chicago.

Merchant Pipe and Boiler Tubes.—The trade in tubular steel is dull. Prices are firm in the absence of business and we quote as follows:

	—Steel— Black.	Galv.
¾ to 6 inches, inclusive.....	73.2	63.2
7 to 12 inches, inclusive.....	70.2	55.2

BOILER TUBES.

	Steel.	Iron.	Seamless.
2¼ to 5 in., inclusive....	63.2	50.2	50.2

Cast Iron Pipe.—The present month should see an active demand for cast iron pipe for spring work. At St. Paul, 2,000 tons will be placed on Dec. 14, and at Indianapolis bids on 1,500 tons of pipe will be received until noon of Dec. 15. A number of small orders for pipe were placed and inquiry is increasing. An aggregate of about 2,000 tons of gas pipe was sold by the leading pipe interest. We quote for 4-inch pipe, $27; 6 to 16-inch, $26; larger size, $25; gas pipe, $1 a ton higher.

Wire Products.—With one exception, the November of 1906, the month just ended was the largest month in the history of the leading wire interest, and December promises very good tonnage also. Particularly in wire nails and barb wire is the demand good. January is expected to bring an unusually large demand from the south and a good year is confidently expected. A couple of contracts for wire rods in which there is from 5,000 to 6,000 tons were placed last week. We quote as follows:

Wire nails, jobbers' carload lots, $1.95; retailers' carload lots, $2; painted barb wire, jobbers' carload lots, $2.10; retailers' carload lots, $2.15, with 30c for galvanizing; plain wire to jobbers in carloads, 1.80c; and to retailers in carloads, 1.85c. Wire rods, Bessemer, $33; open-hearth, $34; chain rods, $33, f. o. b. Pittsburg.

Old Material.—The scrap market, though very firm, appears this week to have been less aggressively strong. The movement of material to consumers was more scattered and entirely at prices lower than those bid for railroad offerings. There has been but little noticeable change from the week previous. While no one looks for any considerable concessions on the part of dealers from the present levels, there is little anticipation of further advances during the current month. Scrap lists on which bids are asked offer more than 13,000 tons of old material, including one 2,500-ton lot of re-rolling rails. The Wisconsin Central has 450 tons, the Chicago, Milwaukee & St. Paul 2,450 tons, the Santa Fe 2,425 tons, and the Baltimore & Ohio 8,420 tons. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$15.75 to 16.25
Old iron rails	19.50 to 20.00
Re-rolling rails (4 ft. and over).	17.25 to 17.75
Old steel rails (4 ft. and under)	15.50 to 16.00
Light section relayers, 45 lbs. and under, subject to inspection....	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards.....	15.25 to 15.75
Heavy melting steel	15.25 to 15.75

We quote, net tons, as follows:

No. 1 R. R. wrought	$14.50 to 15.50
No. 2 R. R. wrought	13.50 to 14.00
Knuckles, couplers and springs..	14.50 to 15.00
Shafting	16.50 to 17.00
Iron car axles	21.00 to 21.50
Steel car axles	18.50 to 19.00
Dealers' forge No. 1	11.75 to 12.25
Pipes and flues	11.00 to 11.50
No. 1 cast, 150 lbs. and less....	14.00 to 14.50
No. 1 mill	9.00 to 9.50
Mixed busheling (Nos. 1 and 2).	9.50 to 10.00
Country sheet	5.50 to 6.00
No. 1 boiler cut	10.50 to 11.00
Boiler punchings	12.50 to 13.00
Cast borings	7.75 to 8.25
Mixed borings, etc.	8.00 to 8.50
Machine shop turnings	9.00 to 9.50
Railroad malleable	14.00 to 14.50
Agricultural malleable	12.00 to 12.50
Stove plate and light cast scrap.	12.25 to 12.75
Old iron splice bars	17.50 to 18.00

CLEVELAND.

End of the Ore Shipping Season—Pig Iron Market Quiet.

Office of THE IRON TRADE REVIEW,
Browning Building, Dec. 8.

Iron Ore.—The lake season has closed with a better showing for shipments than was anticipated. The shipments for November amount to 3,618,095 tons, a decrease of 537,981 tons compared with November, 1907. The shipments to Dec. 1 amounted to 25,348,168 tons, a decrease of 15,849,771 tons, or 38.50 per cent, compared with last year. Earlier in the season it was expected that the decrease would be fully 50 per cent. The shipments from upper lake ports for November, and for the season to Dec. 1, were as follows for the past three years:

Port and dock.	November, 1906.	November, 1907.	November, 1908.
Escanaba	748,912	469,373	586,112
Marquette	233,933	307,547	290,451
Ashland	284,500	319,438	479,015
Superior	626,633	679,237	629,771
Duluth	1,142,959	1,537,438	876,600
Two Harbors	697,223	843,043	756,146
Total	3,734,167	4,156,076	3,618,095

Port and dock.	To Dec. 1, 1906.	To Dec. 1, 1907.	To Dec. 1, 1908.
Escanaba	5,716,272	5,722,416	3,332,229
Marquette	2,743,219	3,009,360	1,468,181
Ashland	3,333,561	3,423,277	2,498,963
Superior	5,979,378	7,427,182	3,538,390
Duluth	11,098,175	13,445,977	8,808,168
Two Harbors	8,102,397	8,169,727	5,702,237
Total	36,973,002	41,197,939	25,348,168

There is very little activity in the ore market, but it is already apparent that some consumers will be short on Bessemer ores. It is probable, however, that furnaces will be able to borrow or trade enough ore to meet their requirements. It is estimated that there are fully 8,000,000 tons of ore now on lower lake docks.

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer and 51½ per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range Bessemer, $4.50; Mesabi Bessemer, $4.25; old range non-Bessemer, $3.70; Mesabi non-Bessemer, $3.50.

Pig Iron.—The market is very quiet, and it is not expected that there will be much buying before Feb. 1. No inquiries of importance are now pending in this territory. Foundries are taking iron on contracts freely, and it is evident that there has been a considerable increase in melt com-

pared with a few months ago. We quote, delivery in Cleveland, for the remainder of the year as follows:

Bessemer	$16.90 to 17.90
No. 1 foundry	17.50 to 17.75
No. 2 foundry	17.00 to 17.25
No. 3 foundry	16.50 to 17.00
No. 2 southern	16.85 to 17.35
Gray forge	15.00 to 16.00
Lake Superior charcoal	19.50 to 20.00
Jackson Co. 8 per cent silvery	20.05

Coke.—Foundries are calling for delivery on coke, and the current demand seems to be fully up to the amount purchased, but there is very little new contracting for either furnace or foundry coke. We quote standard furnace coke on contract, $2 to $2.10, and standard foundry coke on contract at from $2.35 to $2.50. Prompt furnace coke is sold at $1.80 to $1.85, and prompt foundry coke at $2.20 to $2.35.

Finished Materials.—As the period for taking inventories has arrived at many plants, there is a decrease in buying and some of the independent interests complain that the market is extremely dull, this being true particularly of bridge material. In some cases, contracts for bridge work have been taken by fabricators at less than cost in order to keep up organization and give employment to the men. The leading interest reports a very fair run of both new orders and specifications, including a contract for 6,500 tons of steel bars and a moderate tonnage of shapes, plates and skelp. There is very fair demand for steel rails, but prices are irregular, as re-rolling mills are making low quotations which are being met by concerns manufacturing from new steel. The bar iron situation continues to be unsatisfactory. Sheet prices are firmer, and very little is heard of cutting on regular quotations. Jobbers report only a fair amount of business.

Old Material.—Prices are still being maintained, especially on steel material, and dealers continue to hold their stock as against disposing of it directly to consumers. While there is a tendency toward softening of the market in some particulars, yet prices have been marked up 50 cents a ton on railroad wrought and steel axles, as well as malleable iron. We quote f. o. b., Cleveland, as follows:

Old iron rails	$19.00 to 19.50
Old steel rails (re-rolling)	17.00 to 17.50
Old steel rails (under 6 ft.)	17.00 to 17.50
Old car wheels	15.50 to 16.00
Old steel boiler plate	13.50 to 14.00
Steel axles	20.00 to 20.50
Malleable iron (railroad)	15.00 to 15.50
Malleable iron (agricultural)	13.50 to 14.00
Heavy steel	15.75 to 16.25
Country mixed steel	13.50 to 14.00
Low phosphorus	17.00 to 17.50

We quote, net tons, as follows:

No. 1 R. R. wrought	$16.00 to 16.50
No. 1 busheling	13.50 to 14.00
No. 1 machine cast	13.50 to 14.00
Iron axles	19.00 to 19.50
Axle turnings	11.00 to 11.50
Machine shop turnings	9.50 to 10.00
Grate bars	12.00 to 12.50
Pipes and flues	12.50 to 13.00
Tank iron	12.50 to 13.00
Hoop and band iron	9.25 to 9.75
Sheet iron	8.50 to 9.00
Wrought drillings	9.50 to 10.00
Stove plate	12.50 to 13.00
Cast borings	8.50 to 9.00

NEW YORK.

Moderate Sales of Pig Iron—Large Building Contracts Pending.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Dec. 8.

Pig Iron.—Well distributed sales of small and moderate tonnage feature the current market. Several fair blocks of foundry iron have been taken during the week by railway equipment interests, some neat lots of malleable have been placed in New England and west of the Hudson, and in other lines a limited but healthy activity is noted. Prices are holding very firm, with occasional advances or withdrawals from the market. In malleable, low prices are obtainable only on small lots and a higher level is being obtained by valley and lake interests, which are now making the market. Heavy selling is reported from the Buffalo district. No additions to active merchant furnaces are noted, but the Steel Corporation has put in three more stacks, one at its Ohio works and two at Mingo, raising its blast furnace operations to about 57 per cent. We quote, first quarter delivery, at New York tidewater, as follows:

Northern foundry No. 1	$17.75 to 18.25
No. 2X foundry	17.25 to 17.75
No. 2 plain	16.50 to 17.00
No. 2 southern foundry	17.25 to 17.75
Malleable	18.00 to 18.50
Basic	16.50 to 17.00
Gray forge	16.25 to 16.75

Ferro-Alloys.—The general price of $45, seaboard, on ferro-manganese, rules firm as a result of very heavy selling during the past week. One extremely large lot was placed and a lot of 600 tons for second and third quarter delivery brought a slight premium over the level for the first half. Inquiries are pending for two or three carloads of ferro-silicon.

Finished Materials.—It develops that the figuring now being done on the Equitable building by general contractors is at the request of the architects. To the list of large projects on which something definite may be expected soon has been added the extension of the Whitehall building, plans of which are now nearly ready for estimating. This will require from 15,000 to 18,000 tons. The letting of the general contract for the foundations of the Municipal office building brings that into the active class, with 25,000 tons of steel. Congressional appropriations will probably make possible the early completion of the post office building at Thirty-fourth street. Bids have gone in on a double apartment house on Cathedral Parkway, this city, requiring 1,200 tons of steel, preliminary estimates are being prepared on a 22-story building at Dey street and Broadway, bids go in Monday on a 900-ton hotel project at Nashville, a 1,500-ton building for the First National Bank at New Orleans is being figured on, a hotel project at Pensacola is up, and an early award is expected on the Ives Memorial library, plans for which have been revised.

The American Bridge Co. has taken an order for 3,300 tons of steel for bridge work on the Copper River railway in Alaska, the Eastern Steel Co. has secured the order for about 600 tons of steel for the Delaware & Hudson, for bridge and roof truss work and for a steel head frame at one of its mines. The Lackawanna has specified on over 1,000 tons of bridge materials on its new contract with the American Bridge Co., this being in excess of the contract. The Berlin Construction Co. will supply about 200 tons of steel work for the Lozier Mfg. Co. plant at Plattsburg, N. Y. No decision has been announced on the 8,500 tons of steel for the Northern Pacific or the 3,500 tons for the Denver viaduct. The Noel Construction Co., Baltimore, has the general contract for the Chicago city hall, an 11,000-ton project. We quote:

Angles, 3 to 6 inches x ¼-inch and heavier, 1.76c; beams, 3 to 15 inches, 1.76c; tees, 3 x ¼-inch and heavier, 1.81c; plates, carloads, tanks, 1.76c; marine boilers, 2.16c; bar iron, 1.46c to 1.56c; soft steel bars, 1.56c; sheets, No. 28, black, 2.66c.

Old Materials.—The situation manifests little change, although offerings of heavy melting steel are being taken up quickly at good prices. Accumulations in this line, however, are not large. Railway lists for December are only fairly large. We quote, gross tons, New York, delivery, as follows:

Old steel rails, re-rolling	$14.50 to 15.00
Relaying rails	20.50 to 21.50
Old car wheels	13.50 to 14.00
Old iron car axles	19.50 to 20.00
Old steel car axles	18.00 to 19.00
Heavy melting steel	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Iron track scrap	13.50 to 14.00
Wrought pipe	11.50 to 12.00
Cast borings	9.00 to 9.50
Wrought turnings	10.50 to 11.00
Heavy cast scrap	13.00 to 13.50
Railroad malleable	13.00 to 13.50
Stove plate	10.50 to 11.00
Grate bars	10.50 to 11.00

CINCINNATI.

Buying of Pig Iron by Pipe Interest Is the Leading Feature.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Dec. 8.

Pig Iron.—The most conspicuous purchasing during the week has been done by the leading interest in cast iron pipe. The purchases by this interest are reported to have been about 25,000 to 30,000 tons and a number of odds and ends of offerings have been taken off the market in this buying. There is an inquiry from an Ohio manufacturer for 1,000 tons of low silicon, high sulphur iron to substitute for scrap, and also an inquiry for 1,000 tons of foundry iron by a large pump manufacturer. The general market is quiet and the above transactions appear to cover the important trades. Inquiry is light and aside from the sales made to the cast iron pipe makers, buying has been limited. Prices have made but little change, southern iron being quotable at $13 Birmingham for No. 2 foundry for the first half of next year's delivery and for prompt shipment. There is but little call for prompt shipment iron and it is intimated that $13 Birmingham has been shaded in a few isolated cases. Some Virginia iron is reported to have been sold in this territory on a basis of $12.75 Birmingham for prompt shipment. In southern Ohio, $15.50 for No. 2 foundry at furnace is the market, but some furnaces are continuing to hold for $16. The lower grades of iron appear to be scarce, particularly in the south, and $11.50 Birmingham for gray forge is considered minimum. While there is some inquiry for prices on deliveries extending beyond the first half of next year, no quotable basis has been established and some furnaces are declining to make quotations. We quote for prompt shipment and for delivery in the first quarter in 1909, delivered Cincinnati, based on freight rates of $3.25 from Birmingham and $1.10 from Ironton as follows:

Southern foundry No. 1	$16.75 to 17.25
Southern foundry No. 2	16.25 to 16.75
Southern foundry No. 3	15.75 to 16.25
Southern foundry No. 4	15.25 to 15.75
Southern No. 1 soft	16.75 to 17.25
Southern No. 2 soft	16.25 to 16.75
Southern gray forge	14.75 to 15.25
Northern No. 1 foundry	17.10 to 17.60
Northern No. 2 foundry	16.60 to 17.10
Northern No. 3 foundry	16.10 to 16.60
Northern 8 per cent silicon	19.60

Finished Material. — Specifications on contracts the first week in the month have been fair, but do not indicate a material increase. There are some indications of strength in bar iron and some large producers are declining to contract for forward deliveries on the basis of present prices. Jobbers are having a fair store trade and small orders are filled here at the following prices:

Iron and steel bars, 1.85c to 2c, full extras. Angles, 3 x 3 and over, 2.10c to 2.25c; beams and channels, 15 inches and under, 2.10c to 2.25c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16 inch, 2.10c; No. 8, 2.15c; sheets, blue annealed, No. 10, 2.15c to 2.25c; No. 12, 2.20c to 2.30c; No. 14, 2.25c to 2.35c; No. 16, 2.35c to 2.45c; box annealed sheets, Nos. 18 and 20, 2.55c to 2.65c; Nos. 22 and 24, 2.65c to 2.75c; Nos. 25 and 26, 2.70c and 2.80c; No. 27, 2.75c to 2.85c; and No. 28, 2.85c to 2.95c; boiler tubes, 2¾ to 5 inches, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3c base; cold rolled shafting, 47 to 50 per cent off list; steel wire, 2.05c to 2.10c base.

Coke.—Furnace coke is comparatively firm with small offerings of prompt shipment coke and the present oven capacity appears to be fairly well employed in taking care of existing contracts. Wise county coke for furnace use is fairly well sold up. Foundry coke, on the other hand, is apparently easy and readily available for prompt shipment at prices so much below the figures asked for contracts that consumers apparently prefer to buy on the market what they need rather than to commit themselves to contracts at prices 40 to 50 cents per ton higher than the spot market. We quote prices asked on contracts in the leading coke producing districts:

	PER TON.
Wise county furnace coke	$1.90
Wise county foundry coke	2.25 to 2.35
Pocahontas furnace coke	1.85 to 2.00
Pocahontas foundry coke	2.00 to 2.25
Standard Connellsville furnace coke	2.00 to 2.25
Standard Connellsville foundry coke	2.35 to 2.50

Old Material.—While dealers for the most part continue to hold their accumulations at full prices there is some irregularity in quotations. The high price demanded for scrap has a tendency to restrict the demand by melters. The market is difficult to quote, as there is some current business in buying and selling which has but little relationship to the investment stocks. We quote dealers' prices to consumers here as follows:

Old No. 1 R. R. wrought, net tons	$14.50 to 15.00
No. 1 machinery, net tons	13.50 to 14.00
Old iron rails, gross tons	18.00 to 18.50
Old steel rails (re-rolling) gross tons	16.50 to 17.00
Old short lengths, gross tons	16.50 to 17.00
Old iron axles, net tons	17.00 to 18.00
Heavy melting scrap, gross tons	15.50 to 16.00
Stove plate, net tons	11.00 to 11.50
Wrought turnings	7.50 to 8.00
Cast borings, net tons	6.00 to 7.00
Car wheels, gross tons	15.00 to 15.50

Address on Steel Castings.—Dr. Bradley Stoughton of Columbia university, was the speaker of the evening before the regular monthly meeting of the Pittsburg Foundrymen's Association held in the auditorium of the Engineers' Society of Western Pennsylvania, Dec. 7. Dr. Stoughton presented an exposition of "The Manufacture of Steel Castings," comparing the acid and basic open hearth, converter and crucible processes and illustrated his statements with stereopticon views. His remarks were intensely interesting from a metallurgical standpoint and excited keen appreciation from the large crowd present.

PHILADELPHIA.

Placing of Large Rail Order by Pennsy Expected at Early Date.

Office of THE IRON TRADE REVIEW,
408 Central Trust Bldg., Dec. 8.

Pig Iron.—The past week has served to demonstrate the soundness of the recent advance, the new schedule of prices being firmly adhered to, with a lighter volume of business than for some weeks preceding. Buying, however, is continuing in good amount, numerous small orders combining with an occasional sizable lot from a heavy consumer to make up an attractive total tonnage. A good many melters have not yet bought for delivery in advance of Jan. 1, and the trade looks for a substantial movement about that time. December is commonly a quiet month, but this year promises to prove fairly active, though of course running away below the pace set in November. Some fair sized basic sales have been consummated during the week and a good tonnage is pending. Otherwise current activity is principally in foundry. We quote, first quarter delivery at eastern Pennsylvania plants, as follows:

No. 1X foundry	$17.50 to 18.00
No. 2X foundry	17.00 to 17.50
No. 2 plain	16.50 to 17.00
Standard gray forge	15.75 to 16.25
Basic	16.50 to 17.00
Low phosphorus	21.00 to 21.50
No. 2 Birmingham	17.75 to 18.25
No. 2X Virginia	17.00 to 17.50
No. 2 plain Virginia	16.50 to 17.00

Finished Materials.—The market is full of rumors dealing with approaching events of importance in the steel trade. One of the most persistent has it that the Pennsylvania railway's 1909 rail tonnage is to be placed within the next few days and that it will be distributed somewhat in the following manner: Carnegie Steel Co., 83,000 tons; Pennsylvania or Maryland Steel Co., 34,860 tons; Cambria Steel Co., 34,860 tons; Lackawanna Steel Co., 13,280 tons; a total of 166,000 tons.

This apportionment closely follows the ratio followed in previous years. No substantiation is discoverable for this report, further than that published in this column a week ago, stating that a virtual agreement of the difficulties pending between the Pennsylvania system and the rail makers had been reached. In other respects the steel trade reports little change. The American Bridge Co. secured the 400 tons of steel work required for the soap factory of Fels & Co. in this city. A fair volume of contracting is being done, with occasional sales of billets. We quote: Structurals, 1.75c to 1.90c; plates, 1.75c to 1.80c; refined bar iron, 1.45c to 1.50c; steel bars, 1.55c.

Old Materials.—The monthly list of the Pennsylvania system offers some 10,000 tons, and a fair tonnage is included in the New York Central's list. Current buying by the rolling mills is not heavy, but steel mills are taking up scrap offerings sufficiently eagerly to hold the price very firm. We quote, eastern Pennsylvania delivery, as follows:

Old steel rails (re-rolling)	$17.50 to 18.00
No. 1 steel scrap	16.50 to 17.00
Old steel axles	22.00 to 23.00
Old iron axles	25.00 to 26.00
Old iron rails	21.00 to 22.00
Old car wheels	16.00 to 16.50
Choice scrap R. R. No. 1 wrought	19.50 to 20.00
No. 1 yard scrap	17.00 to 17.25
Machinery scrap	15.75 to 16.25
Low phosphorus scrap	18.50 to 19.00
Wrought iron pipe	15.00 to 15.50
No. 1 forge fire scrap	14.75 to 15.25
No. 2 forge fire scrap, ordinary	10.00 to 10.50
Wrought turnings	13.50 to 14.00
Axle turnings, heavy	14.00 to 14.50
Cast borings	12.50 to 13.00
Stove plates	13.00 to 13.50

ST. LOUIS.

Sales of Pig Iron Light—Coke Market is Strong.

Dec. 7.

Pig Iron.—Because of the near approach of the holidays, there was not much improvement in actual orders and inquiries received in the St. Louis territory last week over the previous week. During the last few days, orders aggregating 2,000 to 3,000 tons of southern and northern iron have been placed for shipment over the next three and four months. Inquiries are coming in more rapidly for delivery over the first quarter and half of next year, and prices are firm at $13 to $13.50 Birmingham for No. 2. One or two large furnaces have withdrawn from the market, and others are holding out for higher prices. Ohio No. 2 foundry is quoted at $15.50 to $16, furnaces, for delivery over the first half of next year.

Our prices, delivered, to which the freight of $3.75 from Birmingham has been added, follow:

No. 1 southern	$17.25 to 17.75
No. 2 southern	16.75 to 17.25
No. 3 southern	16.25 to 16.75
No. 4 southern	15.75 to 16.25

Coke.—The coke market is strong at $2.25 to $2.75, ovens, for 72-hour Connellsville foundry, the lower price not being for the best quality. The average price is $2.50, and at this figure contracts may be entered for delivery over the first half of 1909, Connellsville 48-hour furnace coke is quoted at $2 to $2.25, ovens.

The best Virginia and West Virginia 72-hour foundry coke is held at $2.50, ovens. The freight from Connellsvile and the Virginia fields is $2.80 to East St. Louis and St. Louis, and $2.70 from the Virginia fields when shipment is destined beyond St. Louis.

Old Material.—The scrap iron market is firm, with prices as follows:

Cast iron borings, free from foreign material, net tons	$ 6.00
Steel axle turnings, gross tons	12.25
Steel railroad axles, net ton	17.50 to 18.50
Iron railroad axles, net ton	19.00 to 20.00
Miscellaneous steel scrap, gross ton	12.25
Old car wheels, gross ton	16.00
No. 1 railroad cast scrap, net ton	12.00 to 12.50
Heavy machinery cast, net ton	13.00
Stove plate and light cast, net ton	11.50
Sheet iron, net tons, uncut	5.00
No. 1 railroad wrought, net ton	12.00 to 13.00
Railroad malleable, net ton	11.50
Heavy melting steel, net ton	11.50 to 12.00
Relaying rails, net ton	14.00 to 15.00

BUFFALO.

Fair Demand for Pig Iron and Prices Firm.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, Dec. 8.

Pig Iron.—There is a very fair demand for pig iron and prices are firm, but no important inquiries are pending. M. A. Hanna & Co. have closed their option on the Hotchkiss farm of 52 acres on the Niagara river, on which their blast furnace plant is to be built. Construction work has not yet commenced. We quote, f. o. b. Buffalo, as follows:

No. 1X foundry	$16.50 to 17.00
No. 2X foundry	16.00 to 16.50
No. 2 plain	15.50 to 16.00
No. 3X	15.25 to 15.50
Malleable Bessemer	16.50 to 17.00
Gray forge	14.75 to 15.00
Charcoal	20.25 to 20.75

BIRMINGHAM, ALA.

Some Pig Iron Sellers Have Advanced Their Quotations.

Dec. 8.

Alabama pig iron manufacturers have sent out a quotation of $13.50 per ton for No. 2 foundry iron, an advance of 50 cents on the ton to what has been the prevailing price for that product for several weeks. While there have been but few, if any, sales made so far at that price, the companies making the new quotation assert that their order books are in such a condition as to warrant them asking the price, even if they do not get it for a while. Large shipments of iron are being made from the southern territory at present, no small amount of the product going eastward. The indications point to the consumers needing large quantities of iron and asking for immediate delivery. There are but few companies in this district remaining in the market for iron to be delivered during the first quarter of the coming year. Before the middle of January five furnaces will be ready for the torch in the southern territory.

An order for 15,000 tons of cast iron pipe has been landed by the United States Cast Iron Pipe & Foundry Co., the pipe to be shipped within the next few months. With this and other orders already booked or in sight, the plants of this concern will be kept busy many months in the future. The several other cast iron pipe companies have booked some good orders and will be able to keep up a steady operation through the coming year.

BRITISH IRON MARKET.

Slight Improvement in Pig Iron—Stocks Increase.

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Nov. 28.

The pig iron market shows a slight improvement on the week, yesterday's quotation being 49s 7d ($12.14) for No. 3. No great business is being done, but makers are sufficiently confident to refrain from pressing sales, and warrants show an advance on the week of about 6d. Yet the position is not wholly favorable, and there have been fluctuations during the week. The amount in stock rises steadily, this month's increase being over 14,000 tons, bringing the total to about 104,000, nearly 10,000 tons more than this time last year. The shipments for the month have been 80,773, compared with 77,612 tons last month. The weak place in the export market is Germany, which was formerly a good buyer. The German position is considered to be the disturbing factor, everybody being on the qui vive as to what will happen under the new conditions which, in the new year, will follow the collapse of the syndicate. In the Midlands the buying movement seems to have spent itself for the present, but smelters are in a good position well into the new year and are

not worrying. The extreme sensitiveness of the market is shown by the upward leap of 8d on the Cleveland market in a single day. Hematite is a shade easier, especially on the East Coast, where 56s ($13.70) has been accepted for mixed numbers. The downward movement has clearly been arrested with regard to Northampton, Derbyshire and Staffordshire sorts, but any advances are extremely rare, and of slight amounts.

Finished Material.—The British trade in finished iron and steel responds very slowly to the wholesome influence conveyed by American cables. A few new orders for rails have been placed, and this branch of the steel trade is proportionately busier. Some reliance is also placed on the new orders for ships just given out, but it is too early for these to have much effect.

GERMAN IRON MARKET.

Pig Iron Depressed and Outlook Very Gloomy.

Dusseldorf, Nov. 22.—Business is worse than heretofore reported. Best Westfalian hematite has been sold at 51 marks ($12.15) per 1,000 kilos, producers' works, and Luxemburg foundry No. 3, which is an equivalent quality to the Middlesbrough No. 3, is quoted today at 47 to 48 marks ($11.20 to $11.45) also per 1,000 kilos, maker's works. These prices are below costs and they cannot go much lower. Consequently, some consumers have closed their requirements at these prices till July 1, 1909. The makers, however, remain in need of orders, as the few contracts which have been made are quite insufficient for the great production. Besides, the heavy stocks of pig iron and coke are pressing upon the market. Bar iron has been sold lately at about 90 marks ($21.70) per 1,000 kilos f. o. b. Rotterdam, Antwerp, and sheets are down to 102 marks ($24.30) per 1,000 kilos, maker's works. The syndicated products are kept high by the Stahlwerksverband for inland, and for export this trust continues to accept almost any price. This situation is very unhealthy and is bound to bring about a crisis, the more because the political horizon in Germany remains very dark. It is natural that under such circumstances business cannot improve. The threatening new duties are also badly influencing many industries, such as the electrical and gas industry, the tabasco industry, etc. The better reports from the United States have some influence on the stock exchanges, but our iron and steel people do not believe in them. The general opinion regarding America is that the election had already been discounted a long time ago and that even in America conditions want more time for an improvement.

With the above low pig iron prices, it should be possible to export German pig iron to the United States. It is competing already in England, but while there the question of the high phosphorus is prohibitive, it would not be so in the states. So far, only small quantities of German pig iron have been sold in England, but if the English consumers could allow the phosphorus in the hematite with maximum 0.075 per cent, the business to that country would increase very considerably.

METAL MARKET

NEW YORK.

Dec. 8.

Copper.—Despite the certainty that substantial improvement in consumption is being made, transactions of the past week have been limited and the market has merely held its own. Current prices are as follows: Lake, 14⅜c to 14½c; electrolytic, 14⅛c to 14¼c; casting, 14c to 14⅛c.

Pig Tin.—The market continues its weaker tone, brought on a week ago by the metal's unfortunate statistical position, and the current level is from 28¾c to 29¼c.

Pig Lead.—The situation has been fairly steady, though some pressure on the part of western producers to sell has given the market an easier tone. Prices continue at 4.25c to 4.30c, New York.

Spelter.—There has been a fair volume of selling and prices continue about stationary at 5c.

Antimony.—We quote: Cookson's, 8¼c to 8¼c; Hallett's, 8c to 8⅛c; ordinary brands, 7¾c to 8c.

CHICAGO.

Dec. 8.

Market is rather quiet, and prices, with the exception of tin, which is weaker, are without change. Orders for spot shipment are fair, but future business is again inactive. We quote as follows:

Lake copper, carload lots, 14¾c to 15c; casting, carload lots, 14½c; pig tin, 31½c to 32c; spelter, 5c to 5.25c; pig lead, desilverized, 4.45c to 4.50c in 50-ton lots; corroding, 4.85c to 4.95c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c list, f. o. b. LaSalle in car lots of 600-pound flasks; Cookson's antimony, 10½c to 11c; other grades, 10c.

The market for old metals sagged appreciably in the past week and prices fell off from one-fourth to three-fourths cent on all grades.

We have revised our prices on old metals and quote to dealers as follows:

Copper wire, 12¾c; heavy copper, 12¾c; light copper, 11½c; heavy red brass, 11¾c; heavy yellow brass, 8¾c; light brass, 6¾c; No. 1 red brass borings, 9¼c; No. 1 yellow brass borings, 9¼c; brass clippings, 8¾c; tea lead, 3¼c; lead scrap, 3½c; zinc, 3.25c; tin plate, 24c; tin foil, 23c; pewter, 16c; electrotype plates, free from wood, 4c; electrotype dross, 2¾c; stereotype plates, 4¼c; stereotype dross, 3c; prime slab zinc dross, $55 per ton.

ST. LOUIS.

Dec. 7, 1908

Lead and Zinc.—The top price paid for zinc ore in the Missouri-Kansas district last week was $47 a ton for 150 tons of zinc from the Claycomb mine at Zincite. The ore was sold on an assay base of $44, and contained 63 per cent zinc. Quite a number of other sales were reported on a basis of $44. This was an increase of $2 a ton over the previous week, when the highest base price offered was $42. One bin of low-grade Joplin ore brought a base price of $47, in which the percentage of zinc was scarcely more than 40 per cent, commanding a little more than $20. The sale was made on a flat bid, regardless of the assay showing. One sale of 1,000 tons was made from the Galena camp on a assay base of $44, on an assay base of 56 per cent grade. Several hundred tons were also disposed of by the Oronogo Circle Co. on a $43.50 basis. Several of the larger producers are holding out for higher prices. It is reported that the surplus ore on the Aylor land at Prosperity and Carterville is nearly 3,200,000 pounds, and that it is held on a $50 basis. The surplus stock on the Aylor land at Alba is reported to be 400,000 pounds, and 500,000 pounds at the Midnight mines at Zincite.

The demand for lead throughout the week was light. The prevailing price was $51 a ton.

An unexpected influx of orders received by the Lake Superior Corporation following the recent announcement of its shutdown has caused the plant at the Soo to resume operating at once, instead of Jan. 1 as previously announced.

NEW PLANT CONSTRUCTION.

Construction work upon the new plant of the Crescent Iron & Steel Co. at Newcomerstown, O., is progressing favorably and it is expected that operations may be inaugurated about Feb. 1. The company will manufacture a standard line of cold-drawn and cold-rolled products and will have an initial capacity of about 500 tons a month. The main buildings will be two in number, 65 x 150 and 65 x 125 feet, of steel and brick construction. The power plant, 40 x 60 feet, will have about 200 horsepower capacity and the equipment will be furnished by the Federal Engineering Co., Pittsburg. The Schlieper Engineering Co., Pittsburg, will build the muffling and annealing furnaces and the wire-drawing machinery will be supplied by the Turner, Vaughn & Taylor Co., Cuyahoga Falls, O. The Crescent Iron & Steel Co. is capitalized at $125,000, with I. E. Higgins, 1610 Commonwealth building, Pittsburg, as president, and Charles Hyde, president of the Clearfield Steel & Iron Co., as treasurer.

NEW SCRAP MINIMUM LOADS.

The New York Central and West Shore railroads will establish a regulation effective Dec. 24, fixing the minimum carload weight at 20 gross tons on shipments of scrap, excepting only cases where the marked capacity of the car is less, and in which case the minimum shall be at least 15 gross tons. Through tariff publications, this company also announces changes in carload rates on iron and steel scrap and borings less than carload lots, on cast iron radiators carload and less carload lots, and various iron and steel articles and on stoves and stove castings. The shipping points touched by these changes are Albany, Utica, Syracuse and Rochester.

The Ontario & Western will cancel existing commodity rates on pig iron, carloads, from Franklin furnace, N. Y., to various points in the state on Jan. 1.

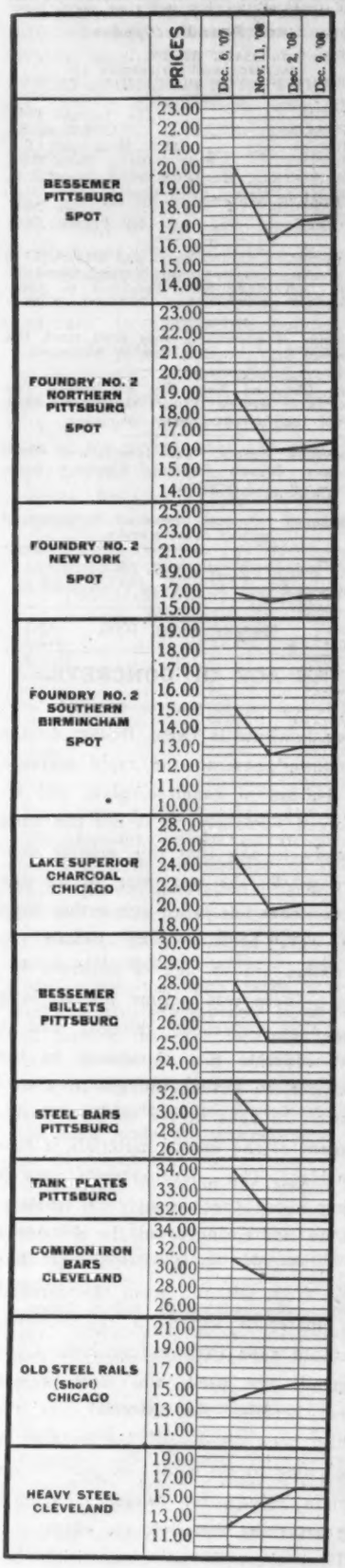
Takes Over Georgia Stack.—The Silver Creek Furnace Co., Rome, Ga., has filed a petition for incorporation, the incorporators of which are Thomas J. Deane and T. W. Lipscomb, of Rome, Ga., and H. L. Campbell, Jefferson county, Tenn. The capital stock of the company is placed at $70,000, paid in, with the privilege of increasing to $500,000. It will operate a plant, formerly the property of the Rome Furnace Co., and will begin operating Jan. 1. The company is empowered to mine and manufacture iron ore, pig iron, coke, charcoal and wood alcohol, and engage in other projects incident to the iron business.

Plan Long Gas Line.—Word has been received in St. Louis that the plans of T. N. Barnsdall of Pittsburg, Pa., and associates, who are seeking a natural gas franchise in St. Louis, are on a much larger scale than was at first supposed, and that they propose what would be little short of a corner on the supply of gas in Oklahoma. Not only is gas to be furnished to St. Louis, but the promotors, it is said, expect to serve all of the towns and cities along the line between St. Louis and Oklahoma. Persons back of the enterprise are alleged to be willing to invest $15,000,000 in constructing a pipe line and in remodeling the gas distributing system in St. Louis. The distance to be covered by the proposed pipe line is 330 miles by air line. It is estimated that it would cost $7,400,000 to construct the line, and that $15,000,000 will be expended before the project is completed.

Standard Specifications.—At the monthly meeting of the Philadelphia Foundryman's Association, Dec. 2, the matter of standard analysis specifications for foundry iron was brought up and discussed at length. The matter was finally left in the hands of a committee consisting of Walter Wood, A. E. Outerbridge, H. L. Haldeman, Dr. Richard Moldenke and Geo. C. Davis. These will draft proposed specifications and report at a future meeting. An interesting paper on this subject was read by Mr. Davis and formed the basis of the discussion. This committee will probably co-operate with the American Foundryman's Association of which Dr. Moldenke is secretary.

New Ore Firm.—E. N. Breitung and Mary Kaufman, heirs of the estate of Edward Breitung, deceased, who with H. L. Kaufman, vice president and general manager of the Mary Charlotte Mining Co., and other companies holding the Breitung mineral lands throughout northern Michigan and Wisconsin, have formed an iron ore sales agency to be known as E. N. Breitung & Co., with offices in Marquette and in Cleveland. G. F. Knapp, who was for 12 years with Oglebay, Norton & Co., Cleveland, has been engaged by the new firm in connection with its sales office at Cleveland.

PRICE CHART.



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AN AGE OF CONCRETE.

The recent formation of The Concrete Institute in Great Britain directs attention anew to the rapid increase in the use of concrete, plain and reinforced. Probably it is not too soon already to say that this quarter century marks the beginning of an age of concrete. It is an age rather than the age, because long before the Christian era an age of concrete began. There was a time not so long ago that superficial thought had it that concrete was a menace to the use of steel, but no thought of a succession of ages in the modern development of the use of materials is reasonable. The developments which bring about the use of these materials do not spring from the discovery or adaptation of the materials, but arise from without, from the demand for materials suited to the achievement of ends already conceived. Concrete is not used, and steel is not used, because the material has recently been discovered, but because it has come to the minds of men to do certain things for which it readily appears these materials are adapted.

Thus there is no competition between steel and concrete, except at minor points. It is not as of two armies contending for the right of progress through a given pass in opposite directions, but rather as of two armies marching in the same direction across a plain, their forces perhaps mingling at certain points, and the progress of the one or the other being the faster at a given time.

It is a fact familiar to the archaeologist that the progress of man through a given age, the stone age, for instance, has had no element of being contemporaneous in different localities; that the governing element is rather one of development of man in the given locality, so that one tribe was in the stone age when man at other points had advanced farther, and man at still other points had not advanced so far. Exactly the same principle is governing the industry which is the greatest consumer of both concrete and steel, the railroad industry. At one point in time, railroads in one locality are still using wooden bridges, while in another they are using steel bridges, under similar topographical conditions, and in still another they are using concrete bridges. The last named have probably passed through their wooden and steel ages; the first named are progressing towards them. The change from one to another is spectacular in a given locality, but over the United States it is a smooth and gradual progress. As a whole, there is little competition between the materials; the changes are rather parts of a general progress.

In the case of hotel and office buildings, it is also a case of progress rather than of competition. The steel skeleton framework is a need of certain densely populated regions, where the density of population has made land values very high. The need of skeleton steel structures is determined by the extent of such very densely populated regions, and the need grows as the extent of such regions increases. Then there are other less densely populated regions the natural requirement of which is the concrete building. The extent of such regions is also increasing. At the last census, 1900, of a total population of 76,148,576, there was a population of 14,208,347 in the 38 cities which had a population of 100,000 or more. In such cities there is more or less need for steel skeleton structures; a somewhat higher limit might even be selected. The present need is better supplied than was the need of 10 years ago, but the congested areas are constantly increasing, bringing fresh demand. The population in cities of from 4,000 to 100,000 was in 1900 practically the same as that in cities of over 100,000, and in these smaller cities the striking demand is for concrete rather than for steel skeleton structures. The two classes have somewhat distinct needs, but in each case the needs are growing, and the march of concrete and the march of steel can go on side by side.

As it is with structural steel in particular that concrete would compete, if there were general competition at all, it is to be noted that statistics of tonnage production of structural shapes would show the effect, if there were a tendency to curtail the use of steel. The production of structural shapes, however, in 1907 showed only about the decrease, from 1906, which could be expected from the sudden slowing down in industry towards the close of the year. The decrease was only 9 per cent, while the production of 1907 was more than double that of any year prior to 1900. No observable inroad, therefore, was made in the consumption of structural shapes, despite the fact that steel in this form probably wears out less, and involves less need of replacement, than steel in any other form, so that nearly all the work done in past years remains.

To no other important branch of the finished steel trade does concrete present so much as a menacing attitude. To some branches, on the other hand, it presents an inviting attitude. In much of the use of concrete there is need for steel reinforcing, and a steel consumption which otherwise would not occur at all. Other work is undertaken with

concrete involving the use of sheet steel piling when, if concrete were not available, no work might be done at all. In the manufacture and use of concrete, much machinery is called for, requiring iron and steel.

On the whole, therefore, the appearance of an age of concrete constitutes an encouragement and not a discouragement to the iron and steel industry. It marks a great increase in the sum total of man's work, and in that work the toll is freely given to the iron and steel industry.

NEW SECRETARY OF THE BRITISH IRON AND STEEL INSTITUTE.

The council of the British Iron and Steel Institute has appointed G. C. Lloyd secretary of the Iron and Steel Institute, in succession to the late Bennett H. Brough. Mr. Lloyd has for some time been secretary of the Institution of Electrical Engineers, and was formerly an assistant in the office of Mr. Brough.

The widow and two young children of Mr. Brough have unfortunately been left in straitened circumstances, and with a view to furnishing substantial help, the council of the Institute has opened a special fund which already amounts to £2,635.

Duty on Ribbed Cylinders.—In a protest of the American Ship Building Co., Cleveland, welded corrugated or ribbed steel cylinders or tubes were assessed with duty at 2½ cents per pound under paragraph 152 of the tariff as "welded cylindrical furnaces made from plate metal," and claimed dutiable under same paragraph as lap-welded steel tubes or flues at 2 cents per pound. The board of general appraisers found that the merchandise differed in no respect from arched Purves furnaces or Purves ribbed steel boiler flues and held accordingly, sustaining the claim of the importers. The board also decided protests of the Athenia Steel & Wire Co., New York, to the effect that band steel is dutiable as strip steel under paragraph 135 and that the same material polished is dutiable at plus 1 cent per pound under paragraph 141.

George B. Leighton, Max Pam and Edward Shearson were re-elected members of the board of directors of the American Steel Foundries at the recent annual meeting.

FOREIGN COMMERCE.

October Iron and Steel Exports Show Large Gain—Authentic Information on Rebate Tin Plate Business.

Iron and steel exports in October showed a gain of 11.6 per cent over September, and a gain of 5.6 per cent over the average of the nine months ending September. Slight decreases were shown by some lines, such as scrap, tin plates and nails, the gains preponderating.

The following table shows the exports by products in October, compared with the monthly average in the 10 months ending October:

IRON AND STEEL EXPORTS GROSS TONS.

	October.	Average ten months.
Scrap	992	1,808
Pig iron	6,521	3,709
Billets, sheet bars, etc.	10,437	9,675
Wire rods	1,199	566
Rails	19,364	17,546
Structural iron and steel	9,079	10,053
Bar iron	661	635
Steel bars	3,711	3,627
Sheets and plates	9,336	8,506
Tin plates	72	1,147
Hoop, band and scroll	215	367
Wire	11,495	11,104
Wire nails and spikes	1,276	2,157
Cut nails and spikes	415	594
All other, including tacks	669	421
Pipes and fittings	10,226	9,620
Totals	85,668	81,536

The decline in scrap from the average of the 10 months is not especially significant of the advance in scrap in this market, since the exports in the immediately preceding month were above the average, being 2,654 tons. The gain in pig iron is significant, being nearly 3,000 tons, September exports having been but slightly above the average. The decline in tin plate exports is striking as shown in the above table, but the real decline occurred months ago. The high point in tin plate exports was in April, when 5,095 gross tons were exported. In May, exports amounted to 2,220 tons; while in no month since May have the tin plate exports amounted to 200 tons. The shutting off of this business was accomplished by Canada's anti-dumping duty. By a government order tin plate was added to the list of commodities on which an extra duty is placed if the exported article is sold at a lower price than is customarily charged in the domestic market. The Welsh makers do not make such distinctions, so that the trade has been transferred to the mother country.

Crude Steel Exports Disappointing.

Exports of billets, sheet bars, etc., continue to be below the expectations. It will be recalled that last December it was announced that a sale of 100,000 tons of sheet bars was made for export to John Lysaght, Ltd., during the first six months of this year, but except for February and March, when crude steel exports were 22,000 to 23,000 tons, the exports ran at a less rate than last year, and evidently comprised only the usual run of miscellaneous business. Indeed, in the whole six months the exports amounted to only 63,685 gross tons. In September another announcement was made, to the effect that a sale of 56,000 tons of sheet bars had been made, for delivery over the last six months of the year, which would be at the rate of 14,000 tons a month. The total crude steel exports in September, however, amounted to only 7,300 tons, and in October to only 10,437 tons. The total crude steel exports in the 10 months of the year have been only 96,752 tons, whereas the two orders reported would call for 128,000 tons in the period, over and above the miscellaneous business.

Below we give a table showing the monthly movement through October:

TONNAGE EXPORTS OF IRON AND STEEL, AND VALUE OF ALL IRON AND STEEL EXPORTS, INCLUDING HARDWARE, MACHINERY, ETC.

1908.	Gross tons.	Value.
January	74,352	$ 13,643,828
February	81,755	14,069,249
March	96,437	15,165,910
April	93,522	15,467,319
May	64,020	11,281,425
June	69,779	11,667,944
July	86,806	12,085,951
August	87,244	12,058,561
September	76,817	11,074,653
October	85,668	11,505,063
Ten months	815,357	$127,985,824

The tonnage column covers all the iron and steel commodities of which the weight is ascertained. It will be observed that a low point was reached in May and June, just when there was a noticeable slackening in mill activity, while the high point was in March, when there appeared to be more mill activity than the domestic market would account for. It is evident that while exports comprise but a small part of our production, the fluctuations this year have made an impress upon our rate of operations.

The values given in the second column of the above table include not only the value of the tonnage lines reported, but the value also of builders' hardware, machinery, etc. These latter lines have a much larger value than the tonnage lines. Roughly speaking, the tonnage lines comprise less than two-fifths the total value.

Imports Decreased.

Iron and steel imports in August, September and October have been at a materially less rate than in the first seven months of the year. The monthly average of all iron and steel

imports in the first seven months of the year was 18,304 gross tons a month; in the next three months 13,243 tons a month, while the fluctuations from month to month in the two periods were very small. A large part of the drop is to be found in tin plate, since the monthly average of tin plate imports was 6,310 tons in the first seven months, and 2,399 tons in the next three months, a decrease in the monthly rate of 3,911 tons. As noted a month ago, the September tin plate imports were the smallest for many years, due, it is assumed, to the leading interest booking a considerable tonnage of rebate business with the Standard Oil Co.

Amount of Rebate Business.

Information has hitherto been lacking as to the amount of rebate tin plate business taken by the American Sheet & Tin Plate Co. under the arrangement with the workmen made late in 1902, whereby they undertook to work on tin plate which would be sold to packers for export containers at 25 per cent less than the regular scale. Comparisons could only be made showing the decrease in tin plate exported with the government rebate. A line on the movement is furnished by recent testimony in connection with the tariff hearings, which was to the effect that in the five years the arrangement was in effect, to the end of 1907, the wage deduction amounted to $282,560. This would cover an average of 450,000 to 500,000 boxes of tin plate a year, about one-third of the business as it existed prior to 1903, but less than one-third of the total business going since this arrangement went into effect. Thus the comparison with previous rebate business has indicated less rebate business done by the American mills than has really been the case. At the time the matter was discussed, however, in the fall of 1902, the understanding was that the manufacturers desired to take the bulk of the business. This they have been unable to do.

IRON AND STEEL IMPORTS, GROSS TONS.

	October.		Ten months, ending October,	
	1907.	1908.	1907.	1908.
Scrap	650	82	25,619	3,748
Pig iron	9,893	8,103	459,040	73,383
Billets, bars and steel, n. e. s..	1,579	568	13,044	7,762
Wire rods	996	933	14,295	9,503
Rails	155	197	3,444	1,321
Structural	132	515	2,159	2,299
Bar iron	2,420	766	32,761	15,801
Sheets and plates	206	191	3,204	1,976
Tin plates	5,140	1,656	51,846	51,368
Hoop, band and scroll	52	203	1,427	697
Totals	21,223	13,214	606,839	167,858

IRON AND STEEL EXPORTS, GROSS TONS.

	October,		Ten months, ending October,	
	1907.	1908.	1907.	1908.
Scrap	1,545	992	24,298	18,083
Pig iron	4,306	6,521	64,415	37,089
Billets, sheet bars, etc.	5,840	10,437	66,133	96,752
Wire rods	392	1,199	10,256	5,662
Rails	34,753	19,364	288,002	175,462
Structural iron and steel....	15,587	9,079	117,774	100,527
Bar iron	2,007	661	21,316	6,352
Steel bars	7,500	3,711	63,351	36,272
Sheets and plates	10,115	9,336	102,563	85,058
Tin plates	430	72	9,387	11,473
Hoop, band and scroll	375	215	6,231	3,672
Wire	15,973	11,495	132,298	111,041
Wire nails and spikes	2,874	1,276	37,695	21,568
Cut nails and spikes	675	415	5,692	5,944
All other, including tacks.	822	669	6,632	4,205
Pipes and fittings	19,976	10,226	143,608	96,197
Totals 123,170		85,668	1,099,651	815,357

WESTINGHOUSE RECEIVERSHIP ENDED.

Upon the application of the receivers Dec. 5 to Judge Jas. S. Young, sitting in the United States circuit court at Pittsburg, the receivership of the Westinghouse Electric & Mfg. Co. was formally terminated. The receiver of the Securities Investment Co., the holding company of the Westinghouse interests, was also discharged at the same time. The receivers of the Westinghouse company, H. S. A. Stewart, T. H. Given and E. M. Herr, through their attorneys, reported to the court that the new stock issued under the plan of reorganization had been heavily subscribed, and that the company was in a strong financial position. Sufficient funds are on hand to provide for all the indebtedness held against the company. The employes have lent substantial aid in the reorganization, and they have bought out of their wages more than $600,000 of the new plan stock at par. The receivers first took charge of the interests of the Westinghouse Electric & Mfg. Co. Oct. 23, 1907.

In the petition praying for the discharge of the receivers, a balance sheet as of Sept. 30 is included and it is stated that this represents substantially the condition in which the company will be turned over to the stockholders. The total assets are given as $88,318,693, of which $10,279,000 is in surplus and $23,311,018 in quick assets. Contingent assets and liabilities are not included in the balance sheet. As of Oct. 23, 1908, these amounted to $3,146,256, and have been reduced to $1,663,789. A supplementary report shows that on Dec. 4, 1908, the receivers had $9,180,844 cash on hand.

E. C. Converse, of New York, director of the United States Steel Corporation, was elected chairman of the board of directors of the reorganized Westinghouse Electric & Mfg. Co. at a meeting held in New York, Dec. 7. Other officers of the company were chosen without change from the old organization as follows: President, George Westinghouse; first vice president, E. M. Herr; second vice president, L. A. Osborn; acting vice presidents, George W. Hebard and Walter M. McFarland; secretary, Charles A. Terry; treasurer, T. W. Sieman; assistant treasurers, E. St. John and H. F. Baltz; auditor, J. C. Bennett; assistant auditors, F. E. Craig and W. B. Covil Jr.

NEW CAR REPAIR SHOPS IN MINNEAPOLIS.

The recently organized Minneapolis Car Co. has purchased 50 acres of land at St. Louis Park, a Minneapolis suburb, and will establish on it a plant for the repairing of freight cars for steam railroads. Ultimately, no doubt, the making of new cars will be undertaken, but the plans for that branch of the work are not entirely decided. About 20 acres of the site has been graded. At the start there will be one building, 90 x 150 feet, two stories, and some smaller buildings. It is expected that the shops will be running in about six weeks, beginning with from 250 to 350 hands. Within a year or so it is hoped that this number will be increased to 1,000. An outgrowth of the Brighton Car Co., of Chicago, which has been engaged in business for two years, the Minneapolis Car Co. is owned by the same interests. Frank Kellerman is president and general manager, and W. J. Grogan is superintendent and treasurer.

The San Francisco dealers in bar iron have reached an agreement on prices which is expected to relieve the demoralized condition in bars that has existed in California for some time. Bars were sold as low as $1.80 per 100 pounds. The price has been fixed for the present at $2.20.

Imports of copper for the month of October were 12,700 tons, compared with 9,500 tons for the corresponding period last year.

The annual meeting of the Buffalo Brake Beam Co. will be held Jan. 13, 1909, at which time the annual report will be issued.

Decrease in Output of Steelmaking Irons

Returns from the coke and anthracite blast furnaces of the country through November show a slight decrease in the production of steel making irons. The total production of the 212 furnaces in blast during November was 1,582,314 tons, compared to 1,573,724 tons in October, an increase of 8,490 tons. The increase was confined entirely to merchant iron and spiegel and ferro, being 21,822 and 1,840 tons in each case, respectively. The steel making iron showed a decrease of 15,172 tons, which lessened production was principally in the states of Alabama and Illinois.

The daily production, however, showed a healthy increase, being 52,744 tons, compared with 50,764 tons in October. The active capacity in blast on the last day of November was 54,751 tons, compared with 52,410 tons in blast on the last day of October. It will be noted that this latter figure agrees quite closely with the average daily production during November.

There is an increase of two in the total number of stacks in the country, the figure now being 402. These new stacks are both in Ohio and are the two new furnaces of the Youngstown Sheet & Tube Co. There were 12 more stacks in blast in November than in October, Pennsylvania having two more, Ohio eight and New York, Tennessee and Wisconsin each one more. There is one active stack less in Virginia. The percentage of total capacity in blast at the end of November was 51.1 per cent, compared to 48.6 per cent at the end of October.

The increase in production is divided among the various states, as follows: Pennsylvania showed a decrease of 2,000 tons, all merchant iron; Ohio had an increased production of 11,000 tons, of which 7,000 tons was merchant iron; Alabama showed a total increase of 1,000 tons, there being an increase of 3,000 tons in merchant iron and a decrease of 2,000 tons in the steel making iron. Virginia showed an increase of 2,000 tons and New Jersey a decrease of 1,000 tons, all merchant iron; New York increased its production 4,000 tons, which was practically all steel making iron; Illinois showed the heaviest decrease, making 18,000 tons less in November than October, of which 17,500 tons was in steel making iron; the Tennessee group had a decreased production of 2,000 tons, all steel making iron, while the Maryland and Georgia group increased their production 6,000 tons each, this being merchant iron in both cases.

The following table shows the production by months during the year:

	1908.	1907.
January	1,043,374	2,194,801
February	1,086,809	2,047,036
March	1,229,856	2,216,709
April	1,155,122	2,226,708
May	1,168,002	2,291,030
June	1,106,300	2,237,420
July	1,228,604	2,253,243
August	1,366,019	2,243,656
September	1,416,252	2,174,148
October	1,573,824	2,359,690
November	1,582,314	1,820,558
December	.....	1,234,733

It will be noted that the increase in production since the low point in January is steadily maintained. Had November had as many days as October, the increase would have compared favorably with that of other months. Considering daily capacity, the increase in November over October is 3.9 per cent, and over January 53.7 per cent.

The daily production shows an average during the various months of the year, as follows:

January	34,316
February	37,476
March	39,672
April	38,504
May	37,677
June	36,876
July	39,632
August	44,065
September	47,208
October	50,764
November	52,744

Stack No. 2 at the Ohio works of the Carnegie Steel Co. was blown in Nov. 30, after having been idle five months while being relined. Three stacks are now blowing at the Ohio plant, and one is idle for repairs.

The Virginia Iron, Coal & Coke Co. announces that it expects to put one of its Watts, Ky., stacks in blast this month.

No. 1 blast furnace of the Pennsylvania Steel Co. was blown in Nov. 13, this being the second stack of the company in operation. No. 1 was also the original stack built by the plant.

Lodge & Shipley Entertain.—On Saturday evening, Nov. 21, the Lodge & Shipley Machine Tool Co., of Cincinnati, gave to its employes and their families a complimentary dinner and dance. The company had just completed a new addition to its shop, 200 x 90 feet, and the men in the shop asked permission of the company to celebrate in a social way the forming of a new mutual aid society among its employes, using the new shop addition for the purpose. The company took the opportunity to tender to its employes not only the use of the room but to provide the dinner and music. There were present about 500 employes and guests. The hall was handsomely decorated and the occasion was one which was much appreciatel by the employes. Addresses were made by William Lodge and Murray Shipley.

NOVEMBER FURNACE REPORT.

STATES—	NO. OF STACKS.	NO. IN BLAST ON LAST DAY OF MONTH. NOV.	OCT.	PERCENTAGE OF TOTAL POSSIBLE OUTPUT MADE.	AV. DAILY CAPACITY IN BLAST LAST DAY OF MONTH.	ACTUAL TONNAGE MAKE. MERCHANT.	NON-MERCHANT.	TOTALS. NOV.	OCT.
Pennsylvania	153	84	82	54.0	24,040.8	163,271	538,160	701,431	703,184
Ohio	65	37	29	49.1	11,066.7	105,019	181,506	286,525	275,619
Alabama	46	23	23	50.9	4,620.7	116,925	24,294	141,219	140,038
Virginia	24	11	12	48.5	965.8	30,647	———	30,647	28,806
New York	25	15	14	59.4	4,077.0	60,639	60,598	121,237	117,863
New Jersey	9	2	2	22.2	542.4	16,273	———	16,273	17,036
Illinois	25	14	14	55.9	4,953.2	16,354	126,465	142,819	160,302
Tennessee	18	11	10						
West Virginia	4	1	1	42.2	1,453.4	36,530	4,524	41,054	43,259
Kentucky	7	1	1						
Maryland	4	2	2						
Wisconsin	6	3	2						
Colorado	6	3	3	50.0	2,345.4	12,546	53,913	66,459	60,723
Indiana	1	1	1						
Georgia	2	1	1						
Texas	3	0	0						
Minnesota	1	1	1	44.4	686.0	20,584	———	20,584	14,768
Michigan	2	1	1						
Missouri	1	1	1						
Spiegel—All states								10,727	8,701
Ferro—All states								3,339	3,525
Totals	402	212	200	51.1	54,751.4	578,788	989,460	1,582,314	1,573,824

CARNEGIE VETERANS HONOR MISS CARNEGIE.

The, Carnegie Veterans' Association, composed of the men associated with Mr. Carnegie in the days when he was active in the steel industry, held its seventh annual meeting in the banquet room of the Carnegie home in New York City, Dec. 4. Mrs. Carnegie, the honorary member of the association, helped her husband receive and sat with the guests at the banquet table. The feature of the evening was the election of Miss Margaret Carnegie to honorary membership. Although most of those making up the association were present, several absentees sent their regrets from foreign countries, including P. T. Berg from Stockholm and J. C. A. Leishman from Constantinople. The meeting was featured by numerous toasts and, as usual, by the reading of a poem by W. B. Dickson, poet-laureate of the association. Officers were continued as follows: President, Andrew Carnegie; vice president, Chas. M. Schwab; secretary and treasurer, C. L. Taylor. Among those in attendance were the following: Judge J. H. Reed, Emil Swenssen, Wm. E. Corey, C. M. Schwab, H. P. Bope, James Scott, G. E. McCague, W. B. Dickson, William L. Abbott, C. W. Baker, Wm. R. Balsinger, W. W. Blackburn, L. T. Brown, A. R. Peacock, L. C. Phipps, J. E. Schwab, H. E. Tener, Jr., E. H. Utley, G. H. Wrightman and E. F. Wood.

PERSONALS.

J. C. Ort, formerly of Nashville, Tenn., has been appointed general manager of the California Iron Works at San Diego, Cal.

Fred A. Gardner, formerly chief engineer of the Union Iron Works, San Francisco, Cal., has opened offices as consulting engineer and marine surveyor in the Merchants' Exchange building, San Francisco.

James Gayley, who recently resigned as director and first vice president of the United States Steel Corporation, has leased offices on the 11th floor of No. 71 Broadway, where he will continue to look after his dry air blast and other interests.

A. H. Carpenter was elected vice president in charge of operations of the Birmingham Car & Mfg. Co., Birmingham, Ala., at a recent meeting of the directors. He was formerly with the Tennessee Coal, Iron & Railroad Co., as general coal agent.

E. F. Axner, in charge of the Chicago office of Mathew Addy & Co., has been appointed to succeed A. H. Carpenter, resigned, as manager of pig iron sales for the Tennessee Coal, Iron & Railroad Co. in the Chicago territory. Mr. Axner will enter upon the new connection Dec. 15.

President Charles Glover, of the Corbin Screw Corporation, has been chosen to succeed Howard S. Hart as head of the Corbin Motor Vehicle Corporation. Mr. Hart has withdrawn to devote his attention to the Hart Cooley Co. Mr. Glover will continue as head of the Corbin Screw Corporation also.

William Kent, author of the well-known "Mechanical Engineers' Pocketbook," and who was up to last June dean of the College of Applied Science at Syracuse University, has accepted the general managership of the Sandusky Foundry & Machine Co., Sandusky, O. Mr. Kent will enter on his new duties on Jan. 1.

J. N. Richards, who for the last 14 years was general sales manager for the Standard Paint Co., has associated himself with the Ernst Wiener Co., railroad specialist for all industries. Mr. Richards will make his headquarters for the present at the main office, 50 Church street, New York.

J. B. Pauley, who has been associated with the purchasing department and has been one of the directing board of the International Harvester Co., has been chosen to take charge of the foreign affairs of the company with headquarters at Lille, France. He will be succeeded in the Chicago office by W. B. Edgar, who has been with the International Harvester Co. since the merger of interests which resulted in its formation.

Leslie B. Powell, who for a number of years has been actively connected with the Hayden-Corbett Chain Co., Columbus, O., has tendered his resignation effective Dec. 24, to accept the position of general sales agent of the Climax Chain Co., of St. Louis. Mr. Powell has made a study of the history of chain making, and has written several technical articles respecting it, some of which have apepared in THE IRON TRADE REVIEW.

Robert Gilchrist, for about 20 years connected with the iron business, first with the Calumet Iron & Steel Co., South Chicago, and more recently with Rogers, Brown & Co., in their New York offices, will, after the first of the year become associated with J. A. Rogers in the ownership and control of the Western Foundry Supply Co. and the Metallic Alloys Co., 50 Church street, New York City. The former company carries on a general foundry supply business and operates mills at East St. Louis and at Elizabethport, N. J. The Metallic Alloys Co. owns extensive manganese ore properties at Elkton, Va., where a large grinding mill has recently been completed.

OBITUARY.

Ellis Lea, member of the firm of Tatnall Lea & Co., Philadelphia, died Nov. 27, of pneumonia, at his home in Germantown. He was a son of the late James M. Lea and was 49 years of age.

Edwin P. Jones, president and general manager of the Vulcan Iron Works, Wilkesbarre, Pa., a director of the Sheldon Axle Works, and widely interested in other business enterprises, died Dec. 2, aged 64 years. He had been ill for a considerable time, death being due to heart trouble. The Jones foundry was established by his father and in 1863 was expanded into the present Vulcan Iron Works. Mr. Jones many years ago worked his way to the head of the establishment and became its general manager.

Eli Morcom, one of the pioneer miners of the Lake Superior region, died at Tower, Minn., Nov. 26, aged 74 years. He was superintendent of the old Quinnesec mine operated by the Menominee Mining Co., and was also asscciated with Capt. John Wickes in the discovery of the Chapin mine. Twenty-five years ago, he was superintendent of the Minnesota Iron Co., and was active in developing the first iron mine in Minnesota and in developing mines also at Ely and on the Mesabi range.

John Carnes, founder of the Lima Locomotive & Machine Works, died Nov. 29, at his home at Lima, O. He was born in Barre, Vt., March 28, 1822. In February, 1869, he went to Lima, and in association with others bought out the establishment of Chatman-Donnelly & Co., and began the manufacture of threshing machines. Later, the plant manufactured saw mill machinery and finally took up the building of locomotives. Mr. Carnes himself made the patterns for the first locomotive that was ever constructed in Lima. Mr. Carnes was an active and public spirited citizen, and did much to advance the interests of his home city.

The Hartford Steam Boiler Inspection & Insurance Co. has secured the contract for the boiler plant equipment at all the plants of the United States Steel Corporation, numbering about 6,000 boilers.

The Reading railroad, for the first time since last January, has no idle freight or coal cars, its entire equipment being now in service.

AMONG MACHINERY MAKERS.

NEW YORK.

Fair Number of Small Orders—Optimistic Feeling.

Office of THE IRON TRADE REVIEW, Room 1005, No. 90 West St., Dec. 8.

Although the routine of small orders is rarely broken by any calling for considerable lots of machine tools, the trade is optimistic over the situation and outlook. Inquiries continue to come in freely, principally for occasional tools for replacement work, as few new concerns are now buying equipment. Export trade also keeps up its moderate improvement, and some very attractive orders are being booked for foreign shipment. A good demand is noted for the smaller sizes of tools, particularly in lathes.

The Farrel Foundry & Machine Co., Ansonia, Conn., through the Vandyck-Churchill Co., New York City, has purchased an American Tool Works Co. planer, 60 x 60 x 16 inches, and a 62-inch King boring drill.

Plans have been completed for the establishment in Jersey City, N. J., of a beam shop by the Metropolitan Bridge Co. This concern, it is reported, is controlled by the Syracuse Bridge Co., Syracuse, N. Y. Work on the shop is to begin at an early date.

The Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., has secured an order from the Standard Sanitary Mfg. Co., Pittsburg, for five Shepard cranes of about 40-foot span, designed for heavy duty. A considerable improvement is noted in crane inquiries.

Chester, Pa., is to have another addition to its already long list of casting plants. A location has been secured at Fourth and Wilson streets, and construction work on a gray iron foundry is soon to begin. Detailed information is not yet obtainable.

The American Tool & Machine Co., New York offices of which have been located at 220 Broadway, has leased more ample quarters at 172-174 Fulton street, to which it will remove before the close of the year.

The Standard Oil Co., which has its refining plant at Bayway, N. J., near completion, has purchased an additional acreage adjoining the works, and it is understood that further building will be done. The Bayway plant is to be the largest of its kind in the world.

The Germantown Tool Works, Philadelphia, has had plans prepared for a three-story factory building, 60 x 80 feet, at 85 Armat street. Tools and hardware are manufactured.

The Keystone Supply & Mfg. Co., 927-935 N. Ninth street, Philadelphia, manufacturing plumbers' supplies, has purchased a large building adjacent to its plant and will make a number of improvements to the property.

Plans have been filed for the erection of a power house, 50 x 100 feet, on Brook avenue near 165th street, New York City, for the Union Railway Co. A. S. Hedman is architect. A somewhat larger power plant is included in the group of buildings planned for the new plant of the American Ice Co. at Glenwood and Montgomery avenues, Philadelphia. Ballinger & Perrot, of that city, are architects.

The boiler works at Boonton, N. J., formerly occupied by the New Jersey Boiler Co., has recently been sold to the Alfred E. Norton Co., a New York corporation. The Norton company will immediately make a number of changes in the plant, and will very shortly, by installation of new machinery and equipment, have the plant fitted to turn out both plate and structural work. It is the intention of the company to have the plant, both in equipment and transportation facilities, second to none in the country for its size. The Norton company has an extensive structural and erection business in the east. Some of its recent important work is the new state armory at Hartford, Conn; at No. 1 Wall street, a skyscraper known in the trade as having its 18 stories of structural steel erected in 21 working days, the new Liberty Street terminal in New York for the Central Railroad of New Jersey, the installation of the armor plate vaults for the Carnegie Trust Co., New York, and many other equally important contracts. Mr. Norton, president of the company, has been actively engaged in the iron and steel business for over 30 years, being associated with the Heckla Iron Works, and with Post & McCord, before going into business for himself. Mr. Shafer, who is in charge of the technical department, is a graduate engineer and a specialist in his line of work, well known in the New York trade. The financial department of the company is under charge of Mr. Bradley, who is a member of the New York and New Jersey bars, and who, for the last 10 years, has been associated in a financial capacity with building corporations.

MILWAUKEE.

New Orders Not Coming in Rapidly, but Cheerful Feeling Prevails.

Milwaukee, Wis., Dec. 7.—Machinery manufacturers say that while the general trade improvement which took place immediately after the election is holding well, the amount of new business is not increasing at the rapid rate predicted in some quarters. Advances are being made slowly, but gradually, and indications are that the improvement is of a healthy and permanent nature. Orders for new equipment are coming in at a fairly good rate and the result is that, while the leading plants have not reached the normal stage, the average output is slowly increasing. Better and larger orders for raw material are being placed by Milwaukee manufacturers according to the leading iron men of the city.

Frederick W. Sivyer, president of the Northwestern Malleable Iron Co., says:

"We are gradually reaching the point of our normal output in our iron business. Our company operates 11 furnaces when running at full capacity. There have been times when since the beginning of the panic of last fall but two of these furnaces were working. At the present time there are seven of the furnaces in operation and the orders which we are receiving daily indicate that we must soon start others. Shortly after the opening of the new year we expect to be running at normal capacity. In my opinion, I believe that the improvement has come to stay."

That the new water power plant which is being constructed at Twin Falls, Wis., on the Peshtigo river for the Northern Hydro-Electric Co., is second only to the Great Northern Power Co.'s plant is the opinion of the Allis-Chalmers Co., Milwaukee, which is turning out the machinery for the new plant. The plant will be equipped with five horizontal twin turbines, having each a capacity of 1,500 horsepower, or an aggregate of 7,500 horsepower. These turbines will form the initial installation and

more will follow as soon as demand for power warrants. The power generated will be carried to Green Bay, Wis., and perhaps later to Marinette, Wis., and Menominee, Mich.

Herbert M. Ramp, superintendent of foundries at the plant of the Fairbanks-Morse Mfg. Co., Beloit, Wis., has resigned and will soon leave for Springfield, Mo., to become general superintendent of the seven plants of the United Iron Co.

The work of rebuilding the foundry plant of the Cedarburg Foundry Co. at Cedarburg, Wis., which was destroyed by fire recently, with a loss of $7,500, will begin at once. The plant will be constructed upon a much larger scale. The recent loss was partly covered by an insurance of $3,000.

With a gain of more than 150 men on the employment rolls, as compared with pay rolls of the summer months, the plant of the Prescott Mfg. Co., at Menominee, Mich., is back to normal operations with about 300 men at work. The plant is busy turning out sawmill machinery for the Sawyer-Goodman Co., at the new lumbering town of Goodman, Wis.

Oscar Zapfe, formerly of Green Bay, Wis., but lately foreman of the shops of the Duluth, South Shore & Atlantic railroad at Marquette, Mich., has joined the Hartman & Nelson Machine Co. at Green Bay. The new firm will be known as the Hartman, Nelson, Zapfe Co. Boiler manufacture and sheet metal working will be added to the work of the company and the general capacity will be increased. The company will occupy the adjoining structure in addition to the present quarters and new machinery will be installed. A new steam heating plant to heat both buildings is now being erected.

The Schaefer Engine Co. at Berlin, Wis., is planning on the erection of a new storage building in the near future. The shops of the company are in busy operation with plenty of orders coming in.

The National Boiler Works at Superior, Wis., is doing a rushing business. The company has the contract for erecting the big grain tanks at the new plant of the Marsden Feed Co. at Superior. In addition, the company is building a number of coal buckets for the Pittsburg Coal Co. and a huge smokestack for a Minneapolis concern.

David E. Hanson, the junior member of the firm of Hanson & Wright, Neenah, Wis., has been granted a patent on a new steel rail fastener device, designed for the purpose of clamping steel rails to cement ties.

The new building of the Straubel Machine Co. at Green Bay, Wis., is fast nearing completion. The firm has been occupying the plant for some time, but full capacity operation will not be reached until all of the new machinery which is expected is installed. Several new lathes and a new drilling machine will be put into operation and arrangements will soon be completed for the company to do its own brass castings. The Straubel marine gasoline engine is one of the successful specialties of the company.

The Racine Electrical Mfg. Co., Racine, Wis., has been incorporated with a capital stock of $25,000 by Charles A. Kraynik, Charles M. Dietrich and Albert E. Anderson.

Because of a lack of orders, the plant of the Algoma Steel Co. at Sault Ste. Marie, Ont., will close within a few days. The demand for rails in Canada has not been as heavy as was expected. The plant, when in full operation, employs 1,500 men.

As a result of the reorganization of the Escanaba Power Co. at Escanaba, Mich., the construction of another dam and power plant on the Escanaba river is assured.

PITTSBURG.

Improvement Continues at a Moderate Rate.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Dec. 8.

The change for the better in machinery activity is gradually continuing, but contracting is far from being satisfactory from the standpoint of the manufacturers, generally speaking. Conditions by degrees are approaching the point where the market will be supported by steady buying, and makers are encouraged to believe that this is not so far distant. Machine tool outlook is improving weekly and present buying is increasing. Considerable figuring is being done on heavy mill engines and machinery, most of this equipment being contemplated for extensions and replacements rather than for new enterprises. Some nice crane business was placed the past week. Rolling mill operators are more actively interested in the roll market and are buying in a moderate way for replacements, though there is a tendency to utilize old rolls as far as possible at present.

The Pittsburg Horse Shoe Co., Pittsburg, has purchased the manufacturing property of the Downieville Pump Co., near Mars, Pa., and will remodel and equip the plant for its line of production. The site consists of one acre and a half and a two-story structure occupies about one acre of the ground.

The Lebanon Valley Iron Co., Lebanon, Pa., has closed for one 12-inch and one 16-inch, three-high bar mills for the enlargement of its plant capacity.

The Crescent Portland Cement Co. is taking figures upon some final contracts for equipment for the new plant which it is erecting at Wampum, Pa. Most of the contracts were placed some time ago.

The equipment of the Darlington Foundry Co., bankrupt, will be offered at public auction at the plant at Darlington, Pa., Dec. 12, by the trustee, Harry Calhoun. The machinery consists of a lathe, 24 inches by 8 feet, planer 36 x 36 inches by 14 feet, pit lathe 7 x 7 feet, radial drill 4 feet by 6-inch swing, 4 feet high, band saw 36 inches, shaper 5 feet, 14-inch stroke, portable forge and anvil, geared iron ladle 6,000 pounds, crane ladles 1,600 pounds, tripper and weigh about 1,500 pounds, wooden flasks, iron flasks, iron weights, belting and office furniture.

The McConway & Torley Co., Pittsburg, manufacturer of malleable iron castings, has closed a deal for the purchase of 110 acres of river frontage near Parnassus, Pa. The site has been acquired for future extensions, but no immediate improvements are contemplated.

The city of Findlay, O., has determined upon the erection of an auxiliary pumping station to its water works and bids are being asked upon an air compressor, engine boiler and other equipment. The pumping station will be of concrete block.

The council of Washington, Pa., has awarded the contract to A. B. Wilson, representing the Reineke-Wagner Pump & Supply Co., Pittsburg, for a 20-horsepower Gardner engine at a bid of $3,500. The engine will be installed in a new sewage disposal plant.

The Babcock & Wilcox Co., New York, has acquired the plant of the Rust Boiler Co., located at Midland, Pa., but no announcement has been made as to the plans for the future operation of the works. The Rust property was held by the Midland Steel Co. interests, being located adjoining the constituent enterprises of that company at Midland. It is a thoroughly modern and improved plant.

CLEVELAND.

Several Big Orders Placed—Number of Inquiries Increasing.

Office of THE IRON TRADE REVIEW, Browning Building, Dec. 8.

Although December is generally thought of as a holiday month and one for closing all books and business of the year, the first week is indicative of a steady market for machinery. During the past few days, the number of sales has increased a small percentage, several big orders having been contracted for. But still the tendency is toward the buying of single machines, instead of in large numbers, while inquiries are steadily increasing on machinery to be installed after the first of the year. There has been a noticeable movement in the building line and many new shops and additions are nearly completed and ready for operation.

An order for 700 Ferro motors, the contract price amounting to nearly $100,000, has been placed with the Ferro Machine & Foundry Co. by the W. H. Mullins Co., of Salem, O. A sale of 250 three-horsepower Ferro Special motors was also recently made to a company in the east. The first of the above orders is the largest single order ever placed for marine motors ranging up to 25 horsepower.

For the last six months the Standard Welding Co. has been operating 24 hours a day, with a business which is 200 per cent better than that of last year at this time. The company is turning out a great number of steel rims for automobiles and scarcely has the facilities for the fulfillment of all its orders.

The Royal Motor Car Co., which has recently passed through receivership, has been reorganized under the name of the Royal Tourist Car Co. The creditors by accepting stock in the new company have relieved the old one of its embarrassment and placed the new one on a firm footing. The following officers have been elected: G. J. Dunham, of Boston, president; H. S. Calhoun, of Cleveland, vice president and treasurer; C. W. Fuller, of Cleveland, secretary.

The building of an addition to the W. S. Tyler Co., which has been under way for some time, is now nearing completion. The total cost of the building will range around $80,000. It is 65 feet wide by 125 feet long, four stories, with steel construction throughout and pressed brick facing. Electric high-speed elevators having a capacity of 12 tons each have been provided for. Connecting the old building with the new will be a fireproof vault for the protection of all papers of value against fire and robbery. Another feature of the addition is the space set aside for the use of girls employed in the factory. This space will include metal lockers and a recreation room.

The Strong, Carlisle & Hammond Co. reports an increased business from the dealer's standpoint and looks forward to a better future. The company is particularly busy in the selling of furnaces for case-hardening and annealing; and of woodworking machinery.

The Waterbury Farrel Foundry & Machine Co. found November to be a better month than the best previous one of the year by 16 per cent. The company has recently received orders from Mexico for machinery and has also made sales in Pittsburg. December promises even to surpass November in prosperity.

The Cleveland Crane & Engineering Co., Wickliffe, O., is finding considerable improvement in business lately, shipments for some time past having been steadily improving. Among their recent shipments are two 10-ton, three-motor, 40-foot span, alternating-current cranes to the Puget Sound navy yard, and one 10-ton, three-motor, 40-foot span crane to the New Orleans navy yard; also one 75-foot, 15-ton crane to Dallas, Tex.; two 20-ton, three-motor cranes to the Isthmian canal commission for the Panama power houses; one 15-ton, three-motor, 50-foot span crane to the Erie Foundry Co., Erie, Pa. Among the cranes the company now has under construction are three 10-ton, two-trolley, five-motor, alternating-current cranes for the Scully Steel & Iron Co., Chicago; 10 three-motor, 48-foot span, high-speed cranes, and two 10-ton, three-motor special trolleys for the Isthmian canal commission, and one 10-ton, three-motor crane for the Chicago Railways Co. One 20-ton, 50-foot span crane for export to Cuba is also being built. Inquiries also have been improving at a very noticeable rate and the present outlook is very bright for an increased and profitable business for 1909.

CINCINNATI.

Disposition to Postpone Giving Orders Until After Jan. 1.

Office of THE IRON TRADE REVIEW, First National Bank Bldg., Dec. 8.

Business in the larger and heavier lines of machine tools has been rather quiet the past week and there is a feeling that a disposition is developing to defer expenditures of importance until after the first of the year, and to this cause is attributed the deferring of orders for large types of machine tools. The outlook for the new year is sufficiently encouraging to give manufacturers confidence and assurances have been received that some good railroad lists of machine tools will be submitted after the first of the year. Indications of railroad buying are watched with eagerness and this feature of the situation continues to be one of the dominant factors in the iron and steel industry.

In the lighter lines of machines and special machinery, a number of the shops are busy. The foundries are gradually increasing their melts. The foundries here depended for a long time on machine tool castings, but since the depression have diversified their work and have sought business outside of Cincinnati to a considerable extent. One large jobbing foundry has been keeping busy on structural work and has recently taken a number of contracts for heavy columns.

The Queen City Punch & Shear Co. is building a large special multiple punch for Chas. Colvin, of South Charleston, O., a maker of iron fences. The punch is designed to make 15 holes at each operation. The Queen City Punch & Shear Co. will issue a new and complete catalog of its line about Jan. 1.

H. M. Norris, of the Bickford Drill & Tool Co., has returned from an extended European trip in the interests of the company and is now in New York attending the meeting of the American Society of Mechanical Engineers.

Philip Rowe, of the Halidie Machinery Co., of Seattle, which company is the agent for a number of the machine tool builders here, was in the city this week and reports business on the Pacific coast opening up in fine shape.

The Y. M. C. A., Cincinnati branch, has inaugurated a system of teaching students sheet metal cutting. Eleven young men are now enrolled in the class and a number of applications have been received. This is but the beginning of a contemplated co-operative course for students in the iron and steel lines, including machine shop work. The details of the co-operative plan are as yet merely under consideration.

The quarterly dinner of the Cincinnati branch of the National Metal Trades Association will be held at the Business Men's Club on Thursday

evening, Dec. 10. The program indicates that the dinner will be one of unusual interest. The speakers will be Hon. Judson Harmon, governor-elect of Ohio; Prof. Frederick C. Hicks, of the University of Cincinnati; H. W. Hoyt, of the Great Lakes Engineering Works, of Detroit; and W. A. Layman, of the Wagner Electric Co., of St. Louis.

The city of Newport, Ky., is preparing to expend $85,000 on its waterworks system, which will probably include a pumping station. At the recent election the people voted for the issuance of bonds in the above amount. At a recent meeting it was reported that the pumps which have been in use for more than 30 years and have also been through a fire at the pumping station, are in great need of immediate repair or replacement.

Stanley E. Krebs, lecturer and educator, was a visitor in Cincinnati during the past week and spent considerable time in investigating the system of co-operative engineering education inaugurated by the University of Cincinnati in conjunction with the machine shops in this city. Mr. Krebs was very favorably impressed with the practicability and efficiency of the system as now in operation and complimented President Dabney of the university and Dean Schneider very highly upon the success of their undertaking and the achievements attained under the system.

St. Louis Furnace Planned.—The Mississippi Valley Iron & Steel Co., with a paid-up capital of $1,500,000, has filed articles of incorporation in St. Louis. H. F. Albers of New York holds $1,250,000 of the stock. The remainder is held by E. J. Burton, W. D. Walker, Samuel Woodward, R. C. Browning, W. P. Stine and G. C. Van Alstyne of St. Louis. According to Mr. Albers, the company will establish a large furnace, probably in St. Louis, or in the St. Louis district, but definite plans have not been worked out. Mr. Albers declined to say where the campany's properties are located, but it is generally understood that 20,000 acres of mineral land, principally iron-bearing, has been purchased in Iron, Crawford, St. Francois, Washing, Wayne and Carter counties, Mo. The company now is mining ore on the land, according to one of its officials, and is shipping to blast furnaces in Chicago.

The Belfont Iron Work Co.'s stack. Ironton, O., was put in blast Nov. 28.

STEEL RAIL ORDERS

Start Mexican Mills—Other Orders Are Expected to Follow.

Mexico City, Dec. 1.—Cia. Fundicion de Fierro y Acero de Monterrey announces that the pending negotiations for the contract for steel rails for the National road has been closed and that the mills will be started this month full capacity to fill this and other orders. The contract is for 20,000 tons of 85-pound rails for delivery in from six to eight months with all necessary fastenings. It is given out that the contract amounts to more than 2,000,000 pesos, but the exact price is not known publicly. It is expected that the order will be increased soon to 50,000 or 75,000 tons conditioned on the first order being satisfactory. The company reports an increase of business in structural lines and that the present daily sales are equal to those before the crisis. On Dec. 1, the company had in its depots at Monterrey, 24,000 tons of coke, 30,000 tons of iron ore, 18,000 tons of coal for gas, and 12,000 tons of coal for steam, and is receiving material daily for an emergency supply. The weekly pay roll now is about 20,000 pesos.

Interest is shown in the order of steel rails for the Mexican roads given to the Dominion Iron & Steel Co. of Canada. Heretofore nearly all of the rails for Mexico have been supplied from the United States. Two years ago, when the United States manufacturers were crowded with orders, a large consignment of steel rails for the Pacific coast extension of the Southern Pacific was received from Spain. In connection with the Canadian order, it is interesting to note the importance of the Canadian connections in trade in Mexico. The Dominion maintains a commercial agent in Mexico City and Canadian interests control the large hydro-electric installation at Necaxca that supplies Mexico City and environs, in which over $22,000,000 is invested. The Canadian Insurance Co. does a large business in Mexico and a branch of the Bank of Montreal is maintained here. The Canadian and Mexican governments have subsidized a line of steamers to ply between the Pacific ports of the countries and an Atlantic line is maintained also.

The Hadfield Steel Works in Sheffield, England, has recently opened an office in Mexico and is seeking the trade. The Jessop Steel Co. is also in the field.

Several large orders for structural steel are being figured on in Mexico City. K. T.

RECENT CUSTOMS DECISIONS.

In protests of A. V. Berner, of Boston, the board of United States general appraisers held that shapes or forms of cold drawn steel are dutiable at 4 7/10 cents per pound under paragraph 135 plus the additional duty specified in paragraph 141 of the tariff. The merchandise was assessed at 45 per cent under paragraph 193 for manufactures of metal, not specially provided for, and the protests were sustained accordingly.

Protests of the Seymour Mfg. Co. were sustained by the board of general appraisers. The board in its decision held that hot rolled wire rods or bars used as raw material for making wire by drawing through dies which is an alloy in chief value of nickel is dutiable at 6 cents per pound under paragraph 185, and not at 45 per cent under paragraph 193 of the tariff act of 1897.

In T. D. 29359 (G. A 6829), the board of general appraisers held that a protest is valid under section 14 of customs administrative act of 1890 if the name of the protestant is typewritten. Section 14 reads in part: "That the decision of the collector as to the rate and amount of duty chargeable upon imported merchandise shall be final and conclusive against all persons interested therein, unless the owner, importer, consignee or agent of such merchandise shall, within 15 days after liquidation, give notice in writing to the collector and the reasons for his objection thereto."

Protests of Hermann Boker & Co., New York, were all sustained by the board of general appraisers wherein the board held (1) that cold rolled steel which was not blued, brightened, or polished better than the grade of cold rolled, smoothed only, was not liable to one cent per pound additional duty under paragraph 141; (2) that "intra steel wire rods" were dutiable at ¾ cent per pound under paragraph 136, being steel wire rods valued at over 4 cents per pound, and not dutiable at 1 3/10 cents per pound under paragraph 135; (3) that strip steel which was assessed with duty at 45 per cent under paragraph 137 for "sheet steel in strips" was dutiable at specific rates per pound according to value under paragraph 135.

SHORTER DAY

Has Become Effective in the Iron Trades of San Francisco.

(Special Correspondence.)

San Francisco, Nov. 26.—The shorter work day for the iron trades will commence Dec. 1, and in a few days the union men who have waited 18 months for the realization of their fond hope, will experience how it feels to work 8¾ hours a day and receive full day's pay. The California Metal Trades Association has mailed posters to all its members, printed in large, black type, to be posted in a conspicuous spot in each shop, proclaiming that the shop, as a member of the association, will carry out the terms of the agreement between the association and the Iron Trades Council, entered into 18 months ago, and that, on and after Dec. 1, 1908, 8¾ hours will be the basis of a work day instead of 9 hours, without change in the minimum wage rate. The reduction of hours applies only to members of unions affected by the agreement.

The employers, members of the California Metal Trades Association, attach special importance to the lopping off of 15 minutes of the day's work, with full pay, to be followed by further reductions in time, at intervals of six months until the 8-hour work day be reached, without reducing the prevailing wage rate. The agreement was made under conditions entirely different from the present, which is emphasized in the agreement. Eighteen months ago, the California shops and foundries were unable to handle the volume of business offered, and the strike of the unionists at that time was diverting from San Francisco. Since then the shops have vastly increased facilities for handling work, but the work has been coming slowly, and many hands in the iron trades are still idle. It was also understood between the contracting parties that the shorter work day would be granted in other parts of the country, so that California should be on an equal footing with its competitors in all sections. This condition and others which were confidently expected, failed to develop, and the employers feel that the agreement is not binding in the spirit in which it was made. But they prefer to live up to the agreement, because they want to test conditions in San Francisco under an agreement with the unions and union men, and will compare them with conditions prevailing in other parts where the open shop exists. Some of the employers claim that, contrary to custom and usage, they are receiving a full day's work for a full day's pay, and a better feeling prevails between employer and men.

The board of public works opened the bids yesterday for supplying engines and turbines which are to be used in supplying the fire boats and pumping stations for the proposed auxiliary fire protecting system. The D'Olier Engineering Co., of Philadelphia, was the lowest bidder at $192,520, which is much less than the cost estimated by the city's engineer. Other bidders are, the Byron Jackson Iron Works of San Francisco, whose bid was next to the lowest; the Allis-Chalmers Co., of Milwaukee, the General Electric Co., and the Westinghouse Machine Co. The contract is to be awarded tomorrow. The city charter demands that the work be given to the lowest responsible bidder, though there are strong influences at work to disregard the charter provision, evade it, and award the work to a local shop.

The state harbor commission decided yesterday to have one more dock built to accommodate shipping. The one to be built is to be almost adjoining the Union Iron Works, in Central Basin, and will have berths for three large vessels to dock at once, and facilities for loading and unloading from ship to car. It will add to the shipping facilities of the Union Iron Works Co.

The harbor commission is improving San Francisco bay and water front at a rate and in a manner never before known at the hands of a political body.

For Prevention of Accidents.—The American Anti-Accident Association, of which Thomas D. West, of Sharpsville, Pa., is president, is preparing to collect an immense amount of information relating to the cause and prevention of accidents, and will soon start an active campaign to secure members The modest charge of $1 per year is made for dues, and it is hoped that there will soon be a large membership among proprietors of manufacturing concerns of the country. Mr. West states that 1,600 people are being daily maimed or killed through accidents, and that fully 75 per cent of the losses from fires, now amounting to nearly $800,000 a day, could be prevented to a large extent.

If the preliminary recommendations of the New York building code revision committee are adopted, future structures in that city will be restricted to 300 feet in height, except those fronting on parks, in which case the limit will be 350 feet. The recommendation is also made that fireproof construction be required for a large class of buildings, including foundries, power plants, oil houses, coal pockets, car barns, etc.

STEADY PROGRESS

Is Being Made Toward Normal Conditions on the North Pacific Coast.

Office of THE IRON TRADE REVIEW,
302 Pioneer Bldg., Seattle, Wash., Nov. 28.

Excellent weather is assisting logging operations on the Pacific coast and with the continued improvement in the lumber business the iron trade of the northwest is making steady progress toward normal conditions. Foundry work is becoming better distributed. Until recently, certain favorably situated plants have been doing nearly all the work while the remainder have been lying practically idle, but with the improvement in conditions more plants are running on fair schedules and there is less contrast in the condition of the various shops. A large number of small business buildings are being erected throughout the northwest at present and this keeps the demand for building columns and similar structural castings good. Heavy hardware is moving briskly. Merchant iron is showing marked tendencies toward higher prices and the local rolling mills are operating on slightly better schedules.

The Oregon Iron & Steel Co., owning a cast iron pipe foundry at Oswego, a suburb of Portland, Ore., expects to reopen its plant about Jan. 1. This works closed down in November, 1907, with a very heavy stock of pipe on hand and has not been operated since. Considerable pipe has been sold, however, and present conditions seem to justify a resumption about Jan. 1. It is the only cast iron pipe foundry west of the Rocky mountains. The company also owns a 125-ton blast furnace situated at Oswego, and declares there is no immediate prospect of blowing in the furnace, rumors to the contrary notwithstanding

The Pacific Iron Works, Portland, Ore., is installing a new forge shop in connection with its foundry and fabricating plant.

The water commission of Astoria, Ore., has asked for bids on 1,300 feet of riveted steel water pipe.

Members of the Canadian Pacific railway machinists' and allied labor unions of Vancouver, B. C., and other western points have decided to extend financial assistance to their brethren on the eastern divisions of the road who have not been taken back to their former employment following the recent strike. Every union man is contributing $1 a week to this fund.

DUTY ON BAR IRON.

Reduction Agreed to Independent Manufacturers—Mr. Lord's Brief.

The following brief has been filed with the ways and means committee of the house of representatives at Washington, as requested, by President James Lord, of the American Iron & Steel Mfg. Co., of Lebanon, Pa.:

On the 25th ult. I addressed your committee in reference to paragraph 123 of the metal schedule of Dingley tariff, which states the duty on bar iron as 0.6 cent per pound.

As the events of the year have clearly indicated that we are to have a new tariff law, revised along the lower rates of duty, a meeting of iron and steel manufacturers was held in New York on the 23d ult. to consider the situation and present their views before your committee.

I was designated by them to speak on the above item. The suggestion of reduction of the tariff on bar iron from 0.6 to 0.5 cent per pound was made after consultation with as many bar iron interests as the limited time permitted. I have since written to all the manufacturers whose addresses could be procured, except those on the Pacific coast, and have received 30 replies, representing the great majority of the tonnage produced in the United States.

While the preference of an overwhelming number would be to make no change, and thus avoid the disturbance of business consequent upon tariff revision, 25 of the 30 recognize the inevitable by endorsing the suggested reduction as above stated; five wish to be counted as greatly opposed to any reduction whatever.

In comparing the duty on iron bars with steel bars, it should be remembered that the former carry a much higher labor cost, as steel bars are rolled with automatic mechanism which cannot be applied to iron. And it should be remembered that during this period of great depression wages have to a remarkable extent been maintained and in no case have I heard of any considerable reduction of wages in this industry.

The brief submitted by James H. Nutt shows that the wages paid for puddling in Great Britain is less than half the American rates.

It is in order to continue the wage of labor at the present remunerative rates that manufacturers are so interested in not reducing the duty below 0.5. I believe that amount is needed as a tariff on labor.

If bar iron was put on the free list, it would still be manufactured in this country, but it would be at the expense of labor, whose wages would necessarily fall to the level of the competing countries, Great Britain, Germany, and Belgium.

The ordinary refined iron of commerce (when partially made from scrap material) is now sold at from $1.35 to $1.50 per 100 pounds, the quality determining the difference between these rates. The average profit to the manufacturer at present is about $1.00 per ton or less. The labor cost in making iron bars is about one-third of the total cost where scrap is largely used; if all muck bar is used, the labor is greatly increased.

The price of refined iron bars in England, Nov. 1, was $29.84 per gross ton, on cars at the mill, equivalent to 1.33¼ cents per pound.

A number of manufacturers have requested me, in presenting this brief, to advocate much lower duties on iron and steel scrap. I will, however, merely state conditions. The demand for this scrap material has been greater than the visible supply, due in part because it has been largely held by speculative dealers.

Canada puts a practically prohibitive duty on iron and steel bars, but only a nominal duty on scrap. Consequently that country can feed her mills with our scrap, while our mills cannot sell them manufactured bars.

Please consider me at your command if I am needed to throw any further light on this subject.

PROMPT DELIVERY

And Tariff Figure in Awarding Contract for Lake Freighter.

Toronto, Canada, Dec. 7.—The Inland Navigation Co. of Hamilton, Ont., has awarded a contract for a 500-foot bulk carrier to the Great Lakes Engineering Works of Detroit, to be delivered June 1, 1909. The vessel will be used in conveying ore from Lake Superior ports to Point Edward, Ont., and grain from Fort William to Buffalo. A. B. McKay, of the Inland Navigation Co., states that the contract was awarded to an American instead of a Canadian firm because of the inability of Canadian ship yards to make prompt delivery, and also to avoid the 25 per cent duty imposed on Canadian vessels when repaired in American ship yards.

The Canadian Northern Railway has given orders to the Rhodes-Cevory Co., Amherst, N. S., for 1,000 box cars, which with passenger equipment will aggregate $1,100,000. With the orders now in hand this will keep the works running for some time.

The steel plant of the Lake Superior Corporation at Sault Ste. Marie was again closed down, owing to lack of orders, on Dec. 2, the management announcing that it would re-open Jan 1. The other departments are operating to their full capacity.

The Dyment foundry at Barrie, Ont., which has been idle since it was burned down and rebuilt two years ago, has been re-opened by A. St. John and A. R. Crocker.

A large storehouse belonging to the Welland Vale Mfg. Co., tool manufacturer, St. Catharines, Ont., was destroyed by fire on Dec. 3, entailing a loss of $40,000, partly covered by insurance.

After considerable delay, the appeal case of the Dominion Coal Co. against the decision rendered by the Canadian courts in favor of the Dominion Iron & Steel Co., giving the latter very heavy damages for breach of contract to furnish coal supplies, came to trial before the judicial committee of the British privy council, Dec. 1. The case is still pending. Dispatches giving full report of the proceedings seem to indicate that the judgment of the lower court will be sustained.

The Canadian Palace Car Co. has been incorporated by E. J. Estes, G. S. Hart, F. H. Markey and others with a capitalization of $1,500,000, to manufacture parlor, dining and sleeping cars on rights obtained from the American Parlor Car Co., Ltd., of New York, with head office at Montreal.

A charter of incorporation has been issued to Joseph Dain, Paul F. Arbenz, Byron J. McCormick and others as the Dain Mfg. Co., Ltd., with $200,000 capital to manufacture farm implements and machinery at Welland, Ont.

The Fisher Robson Mfg. Co, Ltd., of Alliston, Ont., has been organized by Robert Scott, Thomas M. Brown, C. S. Fisher and others with a capital of $100,000 for the manufacture of agricultural implements.

An Active Campaign.—The Railway Business Association has taken up the work of urging that everyone interested in speedy return to activity of transportation interests, and a resumption on the part of the railroads of purchasers of material and equipment, will at once address demands upon their legislative representatives in state and national capitals for reasonable enactments and for a favorable attitude toward a fair adjustment of rates. That the campaign is to be an aggressive one is indicated by the selection of G. M. Basford, assistant to the president of the American Locomotive Co., as acting secretary. Mr. Basford will give undivided attention for several months to the effort which the association is making to show the public that anything hurting railroads also hurts whole communities of people directly and hosts of others indirectly, and that there is immediate necessity for a change toward moderation and calmness in railroad legislation.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

A Successful Meeting in New York—Aeronautics, Metal Cutting Tools, and the Training of Workmen the Principal Subjects of Discussion

The first session of the annual meeting of the American Society of Mechanical Engineers convened, as related in these columns last week, in the Engineering Societies building, New York, on Tuesday evening, Dec. 1. The events of this session were the presidential address of M. L. Holman on "The Conservation of Our National Resources," and Prof. Brashear's brilliant lecture on "Stellar Photography." The regular business and the consideration of professional papers were not taken up until the second session on Wednesday morning.

Wednesday Morning Session.

The second session convened at 9:30 Wednesday morning in the auditorium of the Engineering Societies building with President Holman in the chair. Secretary Rice announced the election of 191 new members of all grades. Following this announcement, the report of the tellers of election was read, indicating that Jesse M. Smith had been unanimously elected president for the ensuing year, and President Holman asked past-Presidents Swasey and Hutton to conduct Mr. Smith to the platform. Mr. Smith thanked the society for the honor conferred on him, and then made a brief address in which he dwelt on the importance of the standing committees of the society and the work which they could do to advance the interests of mechanical engineering. He made a strong plea for the further development of their usefulness and said that a position on any standing committee should be considered one of honor and something to be aspired to by every member. This concluded the routine business of the session and the meeting then passed to the consideration of professional papers, two of which were presented at this session.

The Engineer and the People.

"The Engineer and the People" was the title of the first paper presented by Morris L. Cooke, which, in effect, said:

Many present-day conditions, among them the broadening of human knowledge, and the generally recognized necessity for co-operation, will force the engineering profession and the individual engineer to take a more direct interest in affairs affecting the public. This will be especially true in matters involving engineering. If engineering is to take full possession of the field which the public is willing it should occupy, more effort must be made to enlighten the public as to the objects and achievements of engineering, more effort must be put forth along lines of purely public interest, and every opportunity given the public to co-operate with the engineer.

Various speakers discussed this paper, among them President Hadley of Yale University, who said that the engineering profession will not attain its highest possible value to the community until it follows along the lines indicated in Mr. Cooke's paper. Another speaker pointed out the relation of the engineer to modern civilization and called attention to the lack of public appreciation of the engineers' work. This is largely due to public ignorance of this work, because the engineer as a professional man does less than the members of any other profession to acquaint the public with his work. Engineering societies should seek to guide legislation relating to engineering subjects. It was pointed out that matters of the gravest import, from a technical standpoint, were subject to hastily conceived and ill-considered laws because the existing societies paid no particular attention to these laws while they were being drawn up and passed. F. M. Day discussed the questions raised by Mr. Cooke from the standpoint of an architect, and showed how the architectural societies had influenced public appreciation of good design. He suggested that greater co-operation obtain between the architect and the engineer. Another speaker questioned whether engineers give enough weight to the subject of beauty in their designs.

Past President Frederick W. Taylor stated that the question of strengthening the relation of the society to the public was one deserving consideration. He also emphasized the importance of the work of the standing committees in this respect. With proper administration the society would come to be looked upon by the public as the authoritative body on all engineering questions which involved the public welfare, and he advocated greater interest on the part of the society on engineering education. At the conclusion of the discussion, Ambrose Swasey presented a resolution recommending to the council the appointment of a committee to co-operate in the conservation movement, which resolution was passed. Past President Hutton also gave notice of intention to present at the next meeting an amendment to the constitution of the society enabling it to participate to a greater extent in the conservation movement.

Military Aeronautics.

Major George O. Squier, of the signal corps of the United States army, presented a comprehensive paper on the present status of military aeronautics. In this paper he described the various types of air ships, including dirigible balloons, and recounted the work that had been done in Germany, France and the United States. He described in considerable detail the aeroplanes of the Wright brothers, of Herring, of Farman, and other workers in this field, and then considered the principles governing the design and operation of air ships. The relation of the air ship to the art of war was gone into in considerable detail, and the way in which the use of flying machines would work toward peace was brought out. A number of speakers discussed this paper, among them Prof. Brashear, who paid a glowing tribute to the early work of Prof. Langley.

Wednesday Afternoon Session.

The third session, which convened at 2:30 P. M. Wednesday, was presided over by G. O. Stetson. At this session two papers on oil fuel were presented, in addition to a paper on the total heat of saturated steam and another on a method of obtaining ratios of specific heat of vapors.

A. R. Dodge, of Schenectady, N. Y., presented a new method of obtaining the specific heat of vapors, which does not involve the use of available steam tables conceded to be too inaccurate for such investigations, nor a condition in which the steam is presumed to be without moisture or superheat. This method is based upon the expansion of initially superheated fluid in a throttling calorimeter, and

tables are included showing data for steam.

This paper was discussed by Dr. H. N. Davis, who stated that Dodge's calorimeter methods marked a distinct advance in technique on the subject. Dr. Davis then presented his paper on "The Total Heat of Saturated Steam," in which he showed that Regnault's formula for the total heat of saturated steam is considerably in error. He presented a new formula whose range is from 212 to 400 degrees Fahr., and showed that the greatest error in Regnault's formula in this range is 6 B. T. U. at 275 degrees, but at higher and lower temperatures the error increased rapidly, reaching 18 B. T. U. at 32 degrees. This paper was discussed by a number of speakers, among whom was Prof. Peabody, who stated that it would be necessary to re-compute present steam tables in view of the information given by Dr. Davis. He discussed the paper by means of a number of complicated formulae which he wrote on the blackboard. Profs. Heck and Marx also made remarks on the subject.

Burning Fuel Oil.

C. R. Weymouth presented two papers on this general subject, one of which described the results of tests of the 15,000-kilowatt power plant of the Pacific Light & Power Co., Redondo, Cal., having steam engine prime movers and using crude oil as fuel. The results given indicate remarkable plant economy under all conditions, but the particularly striking feature is the almost uniform fuel economy for the plant unit for all fractional loads from about one-half load up to the maximum load tested. The author believes that the results warrant a careful investigation as to the possibilities in the line of superior plant fuel economy, using the more modern types of steam engines as prime movers. His second paper discussed unnecessary losses in firing fuel oil and described an automatic system for eliminating them, in which an oil pump governor actuated by variations in the boiler steam pressure so varies the oil pressure in a common oil main, and accordingly the simultaneous rate of firing in all burners, as to maintain practically uniform steam pressure at boilers. This variation of pressure in the oil main is the secondary means for controlling the supply of steam to the burners for purposes of atomization, and also for controlling the amount of damper opening, and thus the air supply for combustion. This paper was discussed by a number of speakers, who objected to the conclusions reached by the author. These conclusions apparently indicated that the reciprocating engines in this plant showed a better economy in connection with the system used than would be possible with turbines, and it was to this feature that the speakers principally objected.

Milling Machine Practice.

The session on Thursday morning was presided over by Vice President Fred J. Miller, owing to the indisposition of President Holman. The first paper presented was A. L. De Leeuw's entitled, "Efficiency Tests of Milling Machines and Milling Cutters." This paper was copiously abstracted in the Dec. 3 issue of THE IRON TRADE REVIEW. Mr. Miller opened the discussion, calling Mr. Warner to the chair for the time being. He questioned whether the column and knee type of milling machine should be built to take the heaviest cuts, or should be expected to do so. The milling machine is especially fitted for jobbing work of a constantly changing character on account of the convenience of access of it and the facility of manipulation. These features are more important than the ability to take heavy cuts, for which the knee type is not well adapted. This unfitness is evidenced by the harness which is invariably used to connect the outer end of the arbor and the knee to reduce vibrations when heavy work is being done. While the new type of machine can take heavy cuts, it should not be called on to do so. Mr. Miller then criticised Mr. De Leeuw's apportionment of the power delivered to the machine. He thought that 2 per cent of the total power delivered to the machine should be ample for moving the platen instead of 60 per cent as estimated by the author.

Wilfred Lewis stated that if Mr. De Leeuw had carried his experiments further he would probably have determined 75 per cent as a fair average efficiency for the direct drive of his machine. Working on this basis, the best results in slab milling practice would run from 0.45 to 0.56 cubic inch of metal removed per horsepower, the cutter working in 16-point carbon steel. In face milling better results are obtained. Mr. Lewis took occasion to call attention to results obtained with the cutter described in his paper on milling cutters, presented at this session, in which a capacity of 1 to 1¼ inches of 25-point carbon steel was removed per horsepower, compared to the ½ cubic inch in Mr. De Leeuw's machine. He gave a number of instances of high results with this cutter and passed around some remarkable chips which had been produced. Mr. Lewis stated that he believed the rigidity of the machine was of more importance than the efficiency. This latter can be increased by using a steeper pitch in the feed screw to secure which, however, would tend to sacrifice the rigidity. Fred W. Taylor criticised the paper for the omission of the drawings and specifications of the gear trains used in the machines. He stated that the efficiency of a machine was simply the efficiency of the gearing and that it was improper to present a paper to an engineering society without giving all the data from which results were deduced. Prof. H. Wade Hibbard related an experience in heavy milling in a railroad shop where the machine was run to its capacity, as was determined by twisting off the arbor carrying the cutter. Prof. Flather stated that the output of a machine is the factor of first importance—that the questions of power and efficiency are of minor importance. Prof. Flather gave the cost of removing one pound of metal per minute in a lathe, planer and milling machine as 1, 2½, and 10 horsepower, respectively. Mr. De Leeuw in closing stated that the tendency today is to use the milling machine as a manufacturing tool, as well as in tool room work. He stated that probably the reason it had not been done earlier was that no milling cutters were available which would stand up to the conditions imposed on them.

High Speed Milling Cutters.

Wilfred Lewis and William H. Taylor, of Philadelphia, next presented their paper on the "Development of the High Speed Milling Cutter, with Inserted Blades, for High-Powered Milling Machines." The milling cutter has inserted helical blades of high speed steel, mounted in a steel holder to give a solid backing for the blades on the driving side, thus giving a uniform support for the cutter blade on both sides from end to end. Another point is the form of groove adopted to give a slight curvature to the blade across its width, and thus favor the realization of a lip angle from the cutting side. Not only are the blades held more securely in position by the method adopted, but they are also more easily removed when damaged, and new blades can be easily inserted. The cutting power

of a milling cutter built in this way appears to be beyond the capacity of any machine now on the market, and the endurance of the cutters, as far as experiments have been made, is phenomenal.

In discussing this paper, Fred J. Miller dwelt on the development of the form of cutting of the teeth of a milling cutter, showing how the use of radial faces was a traditional development from the early forming cutters where radial faces were necessary to the preservation of the shape. The radial face does not give the best shape of teeth, inasmuch as they push and jam the metal off instead of shearing it. Mr. Miller said that the authors should add to their tables of results, columns showing the number of cubic inches of metal removed per unit of width of cut, and that comparisons of different cutters could only be made on this basis.

Oberlin Smith inquired as to the best lubricant for cast iron, steel and brass, and also the best angle of rake in the teeth of cutters for the above metals. He also wanted to know if it is possible to make high-speed steel cutters by casting an iron core around them. Mr. Smith's questions provoked the most spirited discussion of the morning. F. W. Taylor promptly criticised the use of the term "lubricant," saying that it was inconceivable to him that any lubricant could be placed between the cutting tool and the chip which bore on the former with a pressure of about 180,000 pounds per square inch. He stated that the proper term should be "cooling medium;" that the only object of using the so-called lubricants was to conduct the heat generated away from the point of the tool, and that for this purpose cold water was the best; that the addition of soap or soda was merely to prevent rusting of the tool and work. A. L. De Leeuw then gave an instance of heavy turning that had been done before the advent of high-speed steel, made possible only by the use of a heavy stream of water for cooling the tool. Oberlin Smith then related his experience in the use of liquid air as a cooling medium, and created considerable amusement by his description of how he failed to pour liquid air from a two-quart can through a ⅜-inch pipe, owing to the expansion of the air in the pipe forcing the liquid back into the can and overcoming the head. Prof. R. T. Stewart took issue with Mr. Taylor that there was no lubricating action in some operations, for instance, the cold drawing of tubing. He stated that various lubricants were absolutely necessary to different reductions in cross-section. Mr. Taylor replied that the cases were not analogous, as in cold drawing the lubricant could be placed on the tube blank and actually pass into the die with the metal. He replied to Oberlin Smith's question about casting inserted tooth high-speed cutters, that Mushet steel could be used for the cutter blade with a cast iron center cast around it, but that high-speed steel could not be so used. In regard to the angle of rake, he considered that milling cutters were governed by the same laws as lathe tools and that the same considerations as to rake angles, etc., applied.

Following this, James Hartness's paper on "Metal Cutting Tools Without Clearance," which is reprinted on another page of this issue, was read. H. H. Supplee gave a very brief discussion on this paper, in which he dwelt on wood-cutting tools, which are of practically the same shape as those described in Mr. Hartness's paper.

Gear Tooth Systems.

The meeting then passed to the consideration of Ralph E. Flander's paper on interchangeable involute gear tooth systems. This paper gives diagrams showing the effect of varying the pressure angle and addendum on the various practical qualities of gearing, such as interference, number of teeth in continuous action, side pressure on bearings, strength, efficiency, durability, smoothness of action, permanency of form, etc. After comparing typical examples of interchangeable gear systems in these particulars, the author concludes that a new standard for heavy, slow-speed gearing is advisable.

A most spirited discussion ensued on this paper, which was participated in by Wilfred Lewis, L. D. Burlingame, B. F. Nisbitt, C. W. Hunt, Oberlin Smith, and others. The discussion was so protracted that the hour of adjournment arrived before it was concluded. This, with Norman Litchfield's paper on "Spur Gearing on Heavy Railway Motor Equipments," was continued in an afternoon session.

In this connection the wonderful possibilities of the Engineering Societies building as a meeting place were demonstrated. The morning session was continued in one auditorium under one of the society's vice presidents, the gas power section met in a second auditorium, under that section's regular officers, while the regular session scheduled for the afternoon was conducted in the main auditorium, all three being carried on simultaneously.

Training of Workmen.

The regular Thursday afternoon session was presided over by Honorary Secretary Hutton. The first paper presented was Amasa Trowbridge's paper on "Liquid Tachometers." The principle on which the Veeder liquid tachometer acts is that the pressure developed by the centrifugal force of the liquid when the instrument is running at a certain speed is a definite quantity. This pressure forces liquid up the indicating tube and is balanced by the pressure due to the height of the column of liquid in the tube. The indications of the instrument depend entirely on the velocity, and do not change if wear is eliminated. It makes little difference whether the liquid employed be something heavy like mercury, or light, as alcohol. The indications are essentially the same for both liquids. The viscosity of the liquids makes a slight difference in the height of the indicating column. This height depends on the centrifugal force, which varies with the square of the speed of the power, hence the graduations will be more open at the top of the scale for the high speeds than at the bottom where the low speeds are measured.

There was no discussion on this paper and Henry L. Gantt's contribution entitled "Training Workmen in Habits of Industry and Co-Operation," printed on another page of this issue, caused the most enthusiastic discussion of the meeting, which was almost uniformly of a commendatory character. Dr. Rudolph Roessler started the discussion by saying that ideas such as those held by Messrs. Gantt and Taylor tend to diminish the warfare between capital and labor and diminished the necessity for labor unions. The Verein Deutscher Ingenieure has taken up the movement started by Mr. Taylor and voted to give subjects of this character place in its journal, and prominent scientists and engineers have promised to support and make use of this system. The works of L. Lowe have adopted Mr. Gantt's system and a chair for the furthering of this movement has been established by the University of Charlottenberg.

James M. Dodge then read a discussion by Chas. Piez, who commended the tone of helpfulness in Mr. Gantt's paper. Mr. Piez condemned what he called "system idolatry," which exists

in some quarters today. System does not make output but simply indicates the lines along which maximum output may be obtained. Many attempts at systematizing have failed because the system is made inflexible and it has been attempted to bend plant, product and consumer to conform to it. Mr. Piez is a firm believer in shop systems but thinks that the system should be made to conform to the limitations of the men under it and not the men made to conform to the system.

Logical and Proper.

L. Sanders stated that Mr. Gantt's system was logical and proper; it was not a substitute for the proper training of workmen and did not pretend to be and does not diminish the necessity for skilled men. H. V. R. Scheele testified to the correctness of Mr. Gantt's principles and told of the great effect they had in increasing the wages and contentment of the workmen. H. B. Hathaway paid a glowing tribute to the system developed by Mr. Gantt and Mr. Taylor and stated that good mechanics can be made under it in about one-half the time formerly required, and cited instances where this had been done. He also advocated the adoption of the methods formulated in this paper for trade schools. C. N. Lauer commended the spirit of helpfulness in the paper, which, however, did not eliminate any of the essentials of good shop management, such as discipline, good work, etc. F. F. Kelly created much amusement by describing how the Taylor system in an establishment with which he was connected had made each worker an inspector. The employes insisted on receiving perfect material from the preceding operatives, as any bad work in previous operations caused them to lose their bonus. J. C. Jergensen explained the workings of the bonus system in a boiler plant, whereby a boiler horsepower, generated from a certain quantity of coal containing a certain percentage of ash was taken as a standard, the fireman receiving 10 per cent of the value saved above this standard as a bonus. The boss fireman obtained a bonus equal to one-half the bonus of the fireman and an equal amount was divided among the three coal passers employed. Any falling off from the standard was deducted from the amount the fireman had saved during the month, and if the fireman demonstrated his inability to earn a bonus he was no longer sure of holding his job. Harrington Emerson stated that the training of men was not the end of the task of proper shop management. He insisted that managers also needed training and wanted Mr. Gantt to write a paper on training managers in habits of thought and co-operation. William Kent replied in part to Mr. Emerson by stating that the way to train managers was to train workmen and that as the present generation of engineers and workmen who were trained under the methods of Gantt and Taylor grew up, good managers would be found in plenty. He emphasized the humanitarian side of the paper and warmly complimented Mr. Gantt for his position in this matter. Many other gentlemen took part in the discussion, the remarks mostly taking the form of glowing tributes to the work of Mr. Gantt and others in the same field.

Industrial Photography.

W. W. Wilcox's paper on "Salt Manufacture" followed Mr. Gantt's paper, and then S. Ashton Hand presented his paper on "Industrial Photography." This paper dealt with the difficulties encountered in photographing machines and shop interiors, pointed out methods of correcting errors and improving the conditions generally. It was discussed by Messrs. Woodbury, Binsse, Hunt and Supplee. Mr. Binsse stated that painting machines for photographing with a salmon pink paint instead of a drab paint, gave much better results. Mr. Supplee stated that the flashlight was an excellent aid to daylight in obtaining detail of parts which were hidden in deep shade.

The last paper of the afternoon was C. J. Mellin's paper on "Articulated Compound Locomotives," in which he discussed the advantages of the Mallet compound and presented instances and tables drawn from some of the later engines built for various American roads. A number of members discussed this paper, including F. J. Cole, Harrington Emerson, W. M. F. Goss and S. M. Vauclain, the latter presenting about 50 lantern slides showing the development of the Mallet articulated compound.

Gas Power.

The gas power section celebrated its first anniversary with a business and professional meeting Thursday afternoon, the attendance being such as to test the capacity of one of the large lecture rooms. The meeting was presided over by Prof. Charles E. Lucke, of Columbia University, chairman of the section, and H. H. Supplee, as secretary, presented the various committee reports. That of the membership committee showed a gratifying enrollment in both the active and associate list.

The standardization committee was unable to make a formal report, but a written discussion of considerable length was presented by Prof. I. S. Hollis, of Harvard University, as representative of Prof. Marks.

This discussion was continued by Wm. Kent, who urged for the higher heat value of hydrogen, pointing out the great confusion when lower heating value is used. He spoke of the direct relation between the heating value of coal and its percentage of volatile matter as shown in the approximate analysis.

Announcement of the selections made by the executive committee for the officers of the section during the ensuing year was then made, as follows: Chairman, F. R. Low, New York City; secretary, George A. Orrok, Brooklyn, N. Y.; executive committee, F. H. Stillman, New York City; Geo. I. Rockwood, Worcester, Mass.; Prof. R. H. Fernald, Cleveland; Prof. F. R. Hutton, New York, and H. H. Supplee, New York. For chairman of the membership committee, Robert T. Lozier was selected, and for chairman of the meetings committee, Cecil P. Poole.

The report of the executive committee recommended the appointment of a large number of committees as outlined below. This arrangement will mean that practically every member of the section will have some definite work to do. The committees follow:

Committees.

Nominating committee (nine members, not over four from New York): To canvass for candidates, and place at least two candidates in nomination for each office, including standing officers and executive committee.

Tellers committee (three members, all in New York district).

Library committee (15 members, largely men in editorial and professional work): To keep track of bibliography and maintain two lists, one of publications in the library, and the other of publications which are not on file in the library. Some member of the engineering magazine staff should be placed upon this committee, which should contain men who can read French, German, Spanish, Italian, and possibly Swedish and Russian.

Committee on installations (three members): To list all installations. For this purpose the committee should prepare a standard report form showing completely the equipment, capacities, etc., with dimensions. This com-

mittee should keep in touch with the manufacturers.

Committee on plant operation (20 members): To prepare forms to show load curves (average, maximum, minimum, variations with the time of day, time of year, etc.), or descriptions to cover these points in case the load curves cannot be plotted. These forms should also give the cost, character and amount of materials, both in total and per unit, such as fuel, lubricating oil, batteries, current, water, gaskets, waste, cleaning, etc. This committee should also collect data on repair, materials and costs; operating labor, number and character of men and wages paid (total and per unit); repair labor, cost, etc.; detailed dimensions, etc., of the plant, and data on reliability of operation, that is, long runs.

Committee on accidents, breakdowns and failures: To keep in touch with the liability companies, builders and operators, especially abroad, relating to both American and foreign equipment.

Committee on question box (five members): To conduct a correspondence on questions and answers and to publish complete lists of all questions and answers as has been done by the national electric light associations and the gas light associations.

Some Reminiscences.

L. H. Nash, of Brooklyn, one of the pioneers in the development of the gas engine, was present to address the meeting on "Reminiscences of a Gas Engine Designer." This was chiefly an outline of certain important features which had been tested from time to time, many of which have taken their place in the development of the gas engine art, some being abandoned after trial for commercial use. Certain of these features are now being perfected and may be found of value. Particular attention was given to a method of operation for marine purposes. The address was illustrated and was listened to with closest attention. It was discussed at length by Prof. Read.

The remainder of the session was devoted to the presentation by title of a paper on "Some Possibilities of the Gasoline Turbine," by Prof. Frank C. Wagner, Terre Haute, Ind. This paper is outlined as follows:

In order to reduce the temperature of the gases at the turbine wheel, either an excess of air or water injection may be used. The relative efficiencies of the two methods is shown to depend upon the amount of compression used, and the efficiencies of the turbine and the air compressor. The work required to compress the air may be materially reduced by using two-stage or three-stage compressors with intercoolers. It appears that with high compression the gasoline turbine may be expected to give efficiencies comparing favorably with the reciprocating gasoline engine.

This paper was generally discussed, its consideration being concluded by Prof. Lucke, who pointed out that present difficulties in this connection are centered in the nozzle and that with the discovery of nozzle which is efficient in cooling the gas, an important advance will be made in this connection.

Proposed Machine Shop Section.

A meeting of 21 members of the society was held in the office on the eleventh floor on Thursday afternoon for the purpose of considering the formation of a new section of the society which should deal with matters relating to the machine shop. Prof. Rautenstrauch, of Columbia University, called the meeting to order and stated its object. F. W. Taylor was elected temporary chairman and Lester G. French temporary secretary. A vigorous discussion took place as to the aim and scope of the proposed section—as to whether it should have a broad scope or a narrow one—and as to its title. A vote was finally taken to decide whether the name of the section should be "Machine Tool," "Machine Shop," or "Machine Shop Practice Session," and it was determined that "Machine Shop Section" was the best name. A resolution was passed appointing a committee of three to formally draw up plans for a machine shop section and submit them to the council of the society for consideration and approval, the committee to report the results to a meeting of the members to be held at the time of the spring meeting of the society.

Friday Morning Session.

The Friday morning session was called to order by Vice President Miller, President Holman being still indisposed. The first paper read was Prof. R. T. Stewart's on the physical properties of carbonic acid and the conditions of its economic storage for transportation.

This paper gives the results of recent investigations into the physical properties of carbonic acid, necessary in investigating the strength and safety of existing carbonic acid cylinders and in the design of new cylinders on a safe and economic basis.

The paper is accompanied by very complete tables, covering, it is believed, a range of conditions sufficient for the solution of any problems apt to arise regarding the physical properties of carbonic acid in connection with its storage and transportation.

This paper was discussed by John C. Miner Jr. and H. G. Tucker, the latter showing that the danger of explosion of carbonic acid cylinders was greatly overrated, the actual number of explosions in the United States in the last few years having averaged one out of every 5,000,000 cylinders.

Prof. O. P. Hood and G. L. Christainsen then presented a paper on the slipping point of rolled boiler tube joints. The object of this paper is to supply data regarding the behavior of joints made by the familiar process of rolling boiler tubes into containing holes. Attention is called to the fact that the stress at which the tube slips is as important as the ultimate strength of the joint. The results of experiments on tube holes of various forms and with various degrees of rolling are shown by plotted curves, and a simple method is indicated whereby the slipping point of the usual joint may be raised so high as to bring the full elastic strength of the tube into use.

In the discussion that ensued on this paper, Colonel Meier brought out that the way to keep tubes from leaking was to keep oil out of the boiler and to keep oil off the tubes and tube sheets while the tubes were being rolled.

The last paper of the day was by Prof. W. F. Durand and was entitled "An Averaging Instrument of Polar Diagrams." This paper was read by title only and there was no discussion. The meeting then adjourned.

Social and Entertainment Features.

The arrangements made for social and entertainment purposes were probably the most comprehensive which have ever obtained at any meeting of the society. Two brilliant lectures, one by Prof. Brashear on "Stellar Photography," and one by Lieut. Frank P. Lahm, of the United States army signal corps, on "Aeronautics," were wonderfully interesting. Both were illustrated by stereopticon and in addition Lieut. Lahm's lecture was illustrated by moving pictures. Lieut. Lahm traced the development of balloons and air-ships from the earliest times down to the present successful machines of Count Zeppelin and the Wright brothers.

An unusual number of visits to manufacturing plants and other points of interest were arranged, including the Pennsylvania tunnel and terminals, the Edison power stations, the Queensboro bridge, the new high pressure fire service system, the Goldschmidt

Thermit Co., Atha Tool Co., Manhattan Rubber Works, Trenton Iron Co., and many other establishments. Some of the excursions seriously interfered with the conduct of the meetings inasmuch as they were held concurrently with the meetings, with the result of greatly decreased attendance at the professional sessions. In addition to the other social features, the regular reception on Thursday was the usual enjoyable affair.

A METAL CUTTING TOOL WITHOUT CLEARANCE[1]

By James Hartness.[2]

This paper sets forth a turning tool that is intended to cut without clearance. The tool consists of a cutter and a holder so constructed as to allow the cutter a slight oscillatory freedom in the holder. The center line on which the cutter oscillates is substantially coincident with the cutting edge. The oscillation of the cutter about the center line does not affect the position of the edge, but it does allow the face of the cutter to swing around to conform to the face of the metal from which the chip is being severed. The objects of this construction are to make possible the use of more acute cutting edges in order to reduce the cutting stresses; to equalize wholly or partly the unbalanced side pressure on the cutting edge; and to obtain a rubbing contact to prevent lateral quivering.

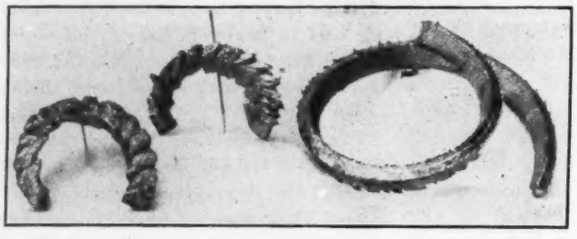


Fig. 1—Characteristic Chips About Actual Size.

Chips at the left made by diamond point tool having 70-degree cutting angle. Chips at the right made by no-clearance tool, 45-degree cutting angle.

Fig. 2—Samples of Chips and Cutters; Cutting Angles From Left to Right, 60 Degrees and 75 Degrees. These Chips Were Produced in an Engine Lathe With Holder Shown in Fig. 12.

The chips were confined edgewise between the body of work and the end of the holder. The breakage of chips taken by the 45-degree tool were due to chips getting caught between the work and tool holder, usually due to the irregular winding of the chip. The chips produced by the 60-degree tool wound up till the circle was greater than the chip could take without breakage.

In order to bring out these objects it is necessary to analyze briefly some of the conditions under which metal is worked in a lathe, dealing particularly with cutting angles, clearance of cutting edges, and the importance of minimizing the tendency of the work and tool to separate under cutting stresses. No attempt is made to discuss the forms of cutting edges for withstanding the heat of high speed service.

The generally accepted cutting angle of greatest endurance under high speed is about 75 degrees and the angle of least resistance, according to some of Dr. Nicolson's tests, is about 60 degrees with an increase below as well as above that angle. The cutting angles of the tool described in the present paper may be varied from the present orthodox angles down to 30 degrees or less, according to the nature of the work.

The results obtained by Dr. Nicolson, which showed an increase in cutting stress for tools more acute than 60 degrees, may have been due to the cuts having been run without cutting oil or suitable cutting lubricant. Furthermore, the comparative lack of durability of the more acute edge below 70 degrees may have been due either to heat or lateral quivering or both. The heat would have been greatly reduced by a liquid cooling medium, especially one having some suitable lubricating qualities, and the lateral quivering may now be eliminated by means explained in this paper. The thin edge of an acute tool is obviously the least suited to carry off heat or to withstand the quivering incident to cutting.

The Class of Work Here Considered.

The means for cutting set forth should be considered from the standpoint of one who sees nothing but lathe work under 20 inches diameter, and of the kind usually found in any machinery building plant, whether it is a navy yard, railroad shop, or automobile building plant; not that the means are of no value in larger work, but being out of the writer's range of experience, such work was not considered in designing the tools described.

A more exact description of the range of work for which this tool is intended would be: Lathe and turret work under 20 inches and over 4 or 5 inches diameter, and less than 8 or 10 inches long; also work up to 2 and 3 feet long, of diameters under 3 to 3½ inches and generally over ¾ or 1 inch.

It includes three classes of work; *a* chuck work, having diameter generally exceeding length, and held wholly by a chuck or face plate; *b*, bar work, which is held in a chuck and steadied by back rests; and *c*, work having dimensions similar to bar work, but which must be turned on center points, with or without following and fixed steady rests. It will be noticed that this excludes all of that kind of larger and heavier lathe work in which the principal duty of the lathe is the rapid removal of the stock. In the particular branch of work under consideration the rapid removal of stock is important, but not paramount. Although the field of work includes all kinds of steel and cast iron, this paper will deal only with the standard open-hearth machinery steel of about 20 points carbon.

In work supported on centers and in chucking work, the connection between the work and tool includes a number of joints, both for sliding the tool in relation to the work, and for the rotation of the work. Each of these joints has more or less slackness, and each of the slides and other members is more or less frail in structure. With a mounting of this kind the cutting edge of

[1]A paper presented at the New York meeting (December, 1908) of the American Society of Mechanical Engineers.

[2]Of Jones & Lamson, Springfield, Vt.

the tool does not pass through the metal without swerving and flinching.

Type of Tools Used.

In the class of work under consideration each piece has several diameters, with shoulders which should be accurately spaced and formed. Nearly all the shoulders required in this class of lathe work are the so-called square shoulders due to the difference in mounting. It works well where there is no chance of vibration, but trouble begins when it is used in a machine like the engine lathe or turret-chucking lathe in which the work is supported by one part of the machine and the tool by another, and the true path of the cutting tool through the metal is dependent on the entire cessary joints for obtaining the various motions in the least objectionable positions. The next step was to devise a means for minimizing the stresses at the cutting edge, and the object of the present paper is to explain how this result has been obtained.

This reduction of stresses may not be important in roughing work in

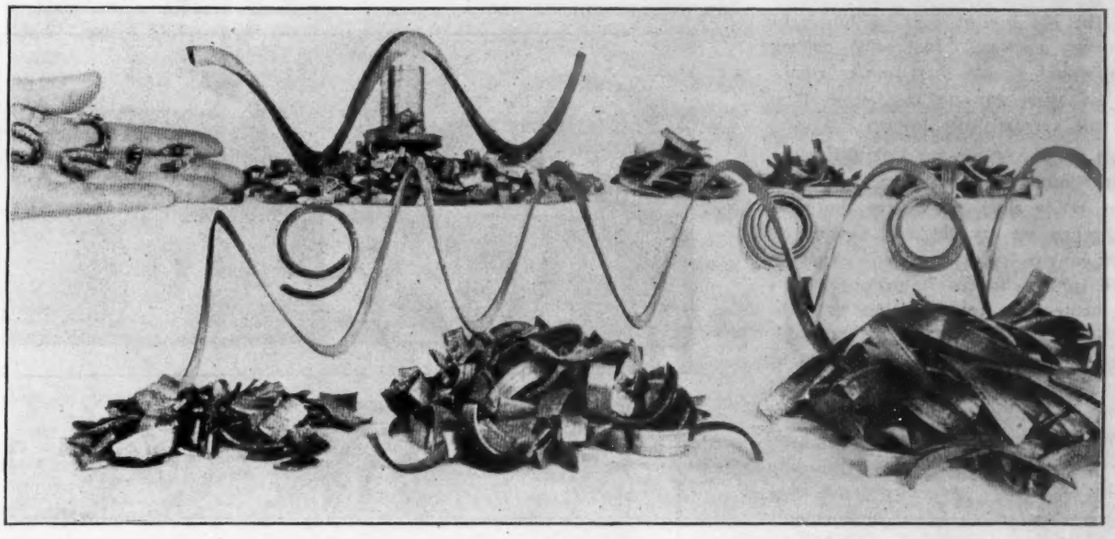


FIG. 3—SAMPLES OF CHIPS; THOSE HELD IN HAND WERE PRODUCED BY BLUNT SIDE TOOL HAVING 75 DEGREES CUTTING ANGLE

These chips were produced by cutters Nos. 2 and 3 in Figs. 4 and 5, running at 40 to 45 feet per minute (periphery speed) and 22 feed per inch; depth of cut $\frac{3}{16}$ inch, reducing from 1¾ inches down to ⅝ inch.

In engine lathe practice these shoulders are "squared up" by a side tool after the other turning has been done by a round nose or diamond point tool, but in the turret lathe for bar work these shoulders are produced by the same tool that takes the stock removing cut.

The tool used in turners for bar work cuts on the same principle as the engine lathe side tool; that is, its rake or top slope is almost wholly side slope. and its cutting edge stands at an angle of 90 degrees to the axis of the work.

In the engine lathe a tool of this character has generally been unsatisfactory for rapid turning, yet in the turret lathe this very tool seems to be universally used for all bar work. The difference in performance seems to be structure of the machine, there being nothing to prevent quivering.

The no-clearance tool to be described is a side tool without clearance. Its under face bears flatly against the work, thereby preventing the lateral quivering which has previously made this type of tool inefficient.

Means for Improving Efficiency.

A machine's efficiency is proportional to its strength to resist its working stresses. There are two ways to increase this efficiency; by strengthening the machine; and by reducing the stresses for a given result.

In the writer's previous work the strengthening of the machine has been accomplished by the elimination of unnecessary features, and placing the neseparating stress, and the tendency to quiver, which we will consider in turn. By direct cutting stress we mean that part of the stress that is directly downward in a lathe. With all other conditions unchanged, we should expect to find that an acute-edged tool would offer the least resistance, and that the difference in direct cutting stresses for which a flinching of the work or machine may be disregarded so long as the machine continues to crush off the metal, but for the kind of work mentioned in this paper it has been considered of first importance.

Direct Cutting Stress.

For the purpose of analysis the cutting stress may be divided into three elements; the direct cutting stress, the

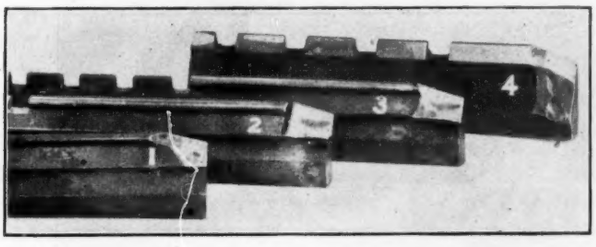


FIG. 4—CUTTERS USED IN THE FLAT TURRET LATHE.

Illustration shows the abrasive contact of chip on the top slope. Nos. 1, 2 and 3 were used in turner, Fig. 10. No. 4 shows one of the earlier forms.

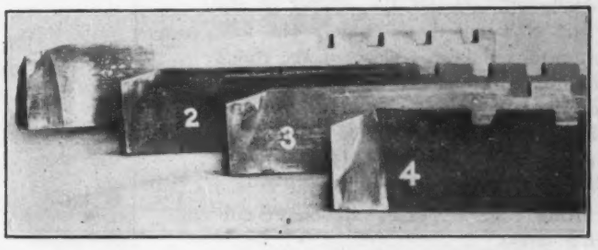


FIG. 5—REVERSE SIDE OF CUTTERS SHOWN IN FIG. 4.

Illustrating the rubbing contact of the tool against the shoulder of the work. Each tool bears the same number in both cuts.

tools of varying cutting angles would show a marked reduction in favor of the more acute tools. Dr. Nicolson's experiments below 60 degrees, already mentioned, showed an increase in cutting stresses and a marked loss in endurance, but these tests were on dry cutting without the benefit of a lubricant or a cooling solution. The thin edge tool is undoubtedly benefited more than the blunt edge tool by lubricant or cutting medium. Just what cutting angle would be the best under conditions of most efficient cooling medium may not yet be fully known.

That there is no marked difference in the blunter tool of varying cutting angles really does not affect the situation when we try the real cutting or sliding angles, which may be roughly stated to be efficient in proportion to their acuteness. It is obvious that the least direct cutting stress for a given depth and feed would be obtained by a straight-edge tool, and one that would take a chip in which there is the least molecular change. Crushing and partially or wholly shearing the chip into chunks which are three or four times the thickness of the feed undoubtedly increase the working stresses and heat.

The cuts accompanying Dr. Nicolson's discussion[3], clearly illustrate the great distortion that takes place even in cutting with an acute tool of 60 degrees and a straight edge. This tool does not have even the disturbing element of shearing action at the edge of the chip, but the experiment shows the distortion of nearly every part of the chip. A tool having a round nose or a blunt edge would doubtless show still greater distortion.

A flat top slope should have a straight cutting edge. The more the edge is rounded the greater the conflict of the metal crowding to the edge. The flow of metal on the top slope of the round nose does not move in one direction wholly, but tends to travel towards the center of the curve. The conflict of currents of metal which approach the center from various parts of the curved cutting edge increases the direct cutting stress.

The crushing process of the present scheme of turning is due both to the bluntness of the cutting angle and the shape of the edge. A curved edge should have a curved top slope in order to remove the chip with the least distortion of the metal. The curved top slope for this purpose would make the shape of the cutting edge similar to the cutting edge of a carpenter's round-nosed chisel. This form of tool is not offered as a practical form, but is mentioned to emphasize the unnatural flow of the chip that must take place on the flat top slope of a round nose tool.

[3]Transactions American Society of Mechanical Engineers, Vol. 28, p. 333.

Separating Stress.

By separating stress we mean that stress which, in turning a shaft, forces the tool outward radially. Increasing this stress causes the work and tool to move apart, and results in variation in diameter, also in irregular and generally inaccurate product, particularly when the rough stock runs eccentric or irregular. Although this separating stress may be lessened by giving the tool more back slope, this is possible only in tools taking light depth cuts. A lathe tool, however, which takes a cut like a side tool, gives little or no tendency to separate radially.

With the side tool set at an angle of 90 degrees to the travel of the feed, the feeding stress does not tend to force the work and tool apart; in fact, this tool may be set so as to produce a slightly beveled shoulder either side of the 90 degrees, so as either to draw the work and tool together when making an overhanging shoulder or to force the work and tool apart when producing an external bevel.

Quivering Stress.

The quivering stress due to the nature of the chip is affected by the cutting angle of the tool. The chunks which make up the parts of a chip are less firmly united in a chip taken by a tool of 70 degrees cutting angle than by a tool of 50 degrees and of course the more firmly united chunks give a more continuous chip with the least vibration of stresses.

In turret lathe practice, especially in bar work, the tool and work are held together by a back rest which follows on the surface produced by the cutter, and in some kinds of turret-chucking work the tools for in-

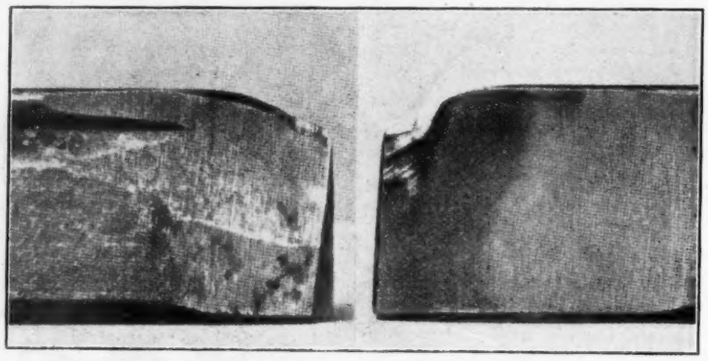


FIG. 6—NO-CLEARANCE TOOL, FULL SIZE.

Showing an equal abrasive effect on each side of edge. View at the left shows the top slope, the angle of which was increased by chip abrasion. View at the right shows the abrasive effect of the shoulder of the work which reduced the cutting angle, but not as much as the abrasion of the chip increased it.

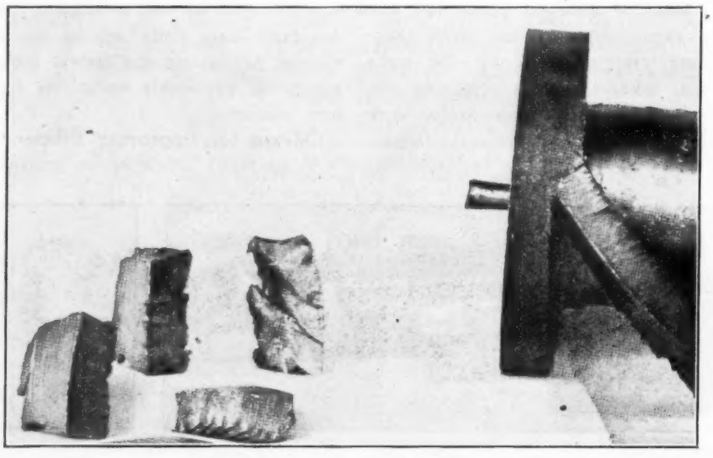


FIG. 7—SAMPLE OF BROKEN CHIPS AND WORK WITH AN UNBROKEN CHIP.

The view is about one-seventh larger than sample, the exact dimensions being 1¾ inches down to about 1-inch diameter. The feed was about seven per inch, cutting angle of tool about 38 degrees, extreme edge 3/32 inch flat. These chips were broken by a scheme similar to that shown in Fig. 14.

terior work are mounted on boring bars which take bearing either in the work or in the chuck which holds the work. When tools get this steadying support directly on or in the work, they are freed from the chattering due to the machine mounting, but not free from that due to their own frailty or to the intermittent flow of the chip as it is taken off in chunks.

Relative Destructive Effects of Heat and Lateral Quivering.

The writer is not unmindful of the effect of heat in the destruction of the cutting edge, and fully realizes that no perfection of mounting of the work and tools will prevent destruction of the cutting edge of the tool by heat, but wishes to bring out the importance of the destructive effect of chattering which is ever present in standard types of machine tools. Heat is undoubtedly most destructive when roughing at high speeds, but the quivering plays a very important, if not the greatest part in edge destruction when finishing at the usual speeds.

Many machines are not run up to the high speed limit of the cutters. Even when provided with ample driving power, the strenuous life of attending a high speed machine is a little too much for the average man. As the speed is reduced, the quivering gains in relative importance, which should be taken into account in considering the no-clearance tool. With the slower speeds, tools should be used that give the best results at those speeds.

Other Considerations.

The failure of the keen edge under normal cutting conditions, and its surprising endurance under some abnormal conditions, seem to indicate great possibilities open to any scheme that would maintain the best conditions. For instance, at one time, we have seen the edge of a diamond point broken off by an ordinarily heavy chip and at another time we have seen a similar tool deeply imbedded into the metal without breakage, the tool having taken a plunge and lifted or plowed up a chip of enormous proportions without breaking the tool. Every lathe hand has seen this performance. Usually it ends with breaking the tool or the center of the lathe, or both, but occasionally the lathe is stopped without breakage; then the lathe hand by great care may separate the work and tool without breaking the edge. The immense chip plowed up by a frail tool demonstrates what a cutting tool can do under some conditions.

We are also aware that under some conditions a cutting tool will actually sharpen itself in the process of cutting, yet neither of these results is regularly maintained. They suggest, however, the possibility of supplying a means by which they can be maintained in regular work.

Clearance.

Since the birth of the slide rest lathe, in which the tool was first guided by mechanism, turning tools have been given clearance and it has been assumed that they would not cut without clearance. Of course it is well known that the orthodox lathe tool goes out of commission after losing its clearance, but that does not demonstrate that a tool cannot cut without clearance. It only proves that the present tools require clearance as they are now formed and mounted.

A tool which has been ground for clearance, and set in such a position that its under face is at an angle to the shoulder produced, presents but a small area to the shoulder of work when the clearance of the extreme edge has given way. The area is so small, compared with the stress of the abrading metal passing it, that it rapidly scores and wears into a rough surface standing at a "negative" clearance angle. A tool with a negative clearance and rough surface quickly goes from bad to worse.

The tool which has by chance been set in an engine lathe so that a comparative large area of the under face rides on the wall of metal does not wear away, because its surface is not subjected to as great abrading pressure per unit of area. Its area is sufficient to withstand abrasion.

It was assumed by the writer that increasing the contact of the under face of the tool against the face of the work would make it possible to cut without clearance. The advantage of a no-clearance tool is that its face rides on a good area and supports the under edge against the pressure of the chip, thus relieving the edge from the one-sided pressure which must be borne by a tool having clearance. This one-sided pressure may be wholly or only partly relieved.

Of course, in all of the former types of tools the cutting edge must withstand the stress, which is wholly one-sided, excepting for the occasional condition stated, in which a cutting tool obtained by chance a bearing on its clearance face.

The No-Clearance Tool.

In order to enable the tool to ride flatly against the wall of metal from which the chip is being removed, we have mounted it to allow a comparatively free swiveling action on a center line that is substantially coincident with the cutting edge of the tool. When the tool is so mounted the pressure of the chip on the top slope tends to throw the so-called clearance face against the shoulder,

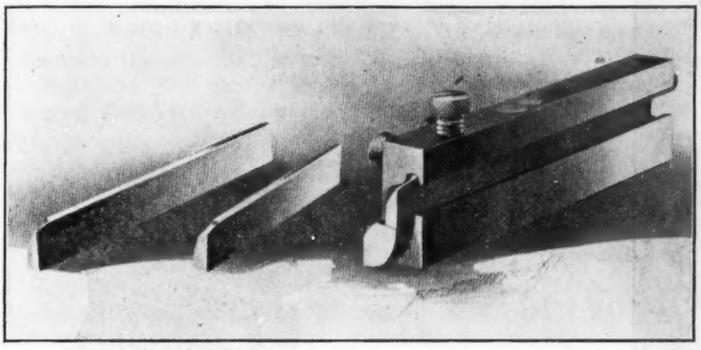


FIG. 9—VIEW OF OTHER SIDE OF TOOL SHOWN IN FIG. 7.

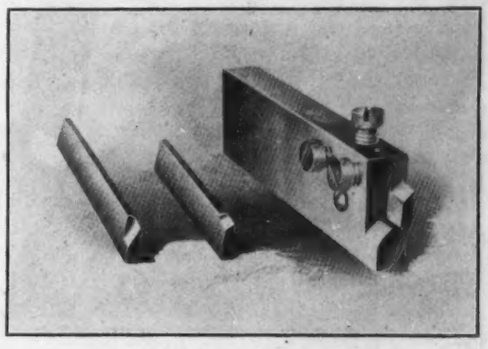


FIG. 8—NO-CLEARANCE TOOL FOR STANDARD ENGINE LATHE TOOL POST, WITH THREE CUTTERS OF DIFFERENT ANGLES.

for the mounting allows the tool to swing around to the angle that may be necessary to fit any work form, from a straight surface in planer work and the nearly straight surface in work of large diameter down to the angle of a helix obtained by the coarse feed on work of relatively small diameter.

A tool so mounted either swings automatically to adapt itself to angularity of feed, or may be swung by hand as soon as the cut is started. Its natural tendency holds it snugly against the metal, but the force may be varied from one that equalizes the stress on each side of the cutting edge down to a very slight stress which only holds the tool in no-clearance position. An important feature is that the tool is free to swing around to offset the unequal wear on the "clearance" face.

In the early experiments the cutters used were clamped rigidly in a holder, which in turn was pivotally mounted on a fixed holder. The cutting edge of the tool was so located as to stand exactly on the center line of the swiveling holder. In the later experiments the scheme has been simplified by loosely mounting the cutter itself, providing it with a round bottom struck from a center line which is near the cutting corner of the tool. The cutting edge is usually standing at an angle to its center line of swivel, giving the tool a front slope. The scheme of inclining the cutting edge to the line of swivel was adopted for the purpose of using a bar-shaped tool in which its shape could be maintained by grinding, for with this shape grinding back the end provides for the wearing down of the top edge. This gives the tool a front slope when the swiveling center is kept horizontal. In some cases it may be well to tilt the holder to an angle that brings the cutting edge horizontal.

This departure from the ideal center position of the line of swivel is not sufficient to cause any trouble. In fact the pivotal line need not be exactly parallel to the cutting edge, neither is it necessary to have it very near the center line of swivel. It is probable that under some conditions the cutting edge may advantageously be located either above or below or on either side of the cutting edge. The exact location of the cutting edge relative to the center of oscillation partly determines the pressure with which the tool rides against the wall of metal from which the chip is taken.

The extreme top edge of the tool, in some instances, has been slightly flattened on the acuter angles, the flat measuring from about 1/64 inch to 1/32 inch, and standing either 90 degrees from the so-called clearance face or sloping in either direction. Very good results were obtained by giving it a negative side slope standing at a maximum angle of from 10 degrees to 15 degrees from the horizontal. This top flat seems to make a good resting place for the false edge, and it may be that its successful operation is dependent on the false edge.

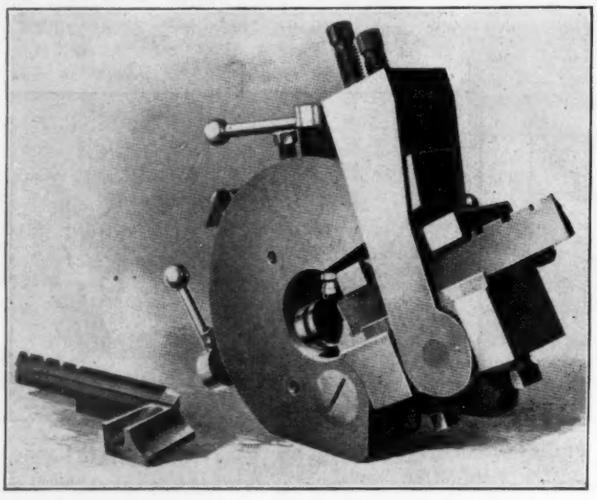


FIG. 10—THE NO-CLEARANCE TURNING TOOL FOR THE FLAT TURRET LATHE.

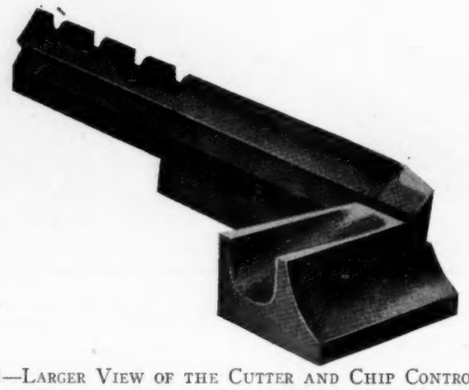


FIG. 11—LARGER VIEW OF THE CUTTER AND CHIP CONTROLLER SHOWN IN FIG. 10.

Chip Lifter and Chip Control.

The chip produced by the acute angle tools is a continuous chip possessing great lateral strength. In some of the first experiments with this tool, chips having a depth of about 3/8 inch and produced by a feed of six to the inch, were found exceedingly troublesome, especially when allowed to run out to lengths of 5 to 15 feet.

The lateral stiffness of the chip of the more acute tool made it possible to increase the tearing open or splitting effect which occurs in cutting metals. To increase the tearing action it is necessary to allow the chip, after it has passed from the edge of the tool, to pass over a lifter in the form of a wedge, either formed integrally with the tool or placed in the path of the chip near the tool, having an angle that not only assists in tearing the metal ahead of the tool, but also relieves the slope of the tool near the edge from an important part of the labor.

In other words, a chip possessing lateral strength made it possible to carry an important part of the cutting or splitting action farther away from the extreme edge. The heat generated by this part of the work, because of its position, of course in no way reduces the life of the extreme cutting edge. Experiments with the chip lifting scheme seem to indicate that under ideal conditions the duty of the extreme edge of the tool may be simply to cut through metal which may be under more or less of a tearing or splitting stress.

Although this chip lifting effect may be produced by a top slope having a curved surface, it has seemed best for the convenience of grinding the tool on an ordinary wheel to keep the top slope of the cutter a flat surface, and to introduce this chip lifter as a separate member, either as a

part of the tool holder or in conjunction with the chip breaker to be described.

For turning bar work in the turret lathe it has seemed best to adopt a chip breaker which produces a fracture by placing an obstruction in the path of the chip at such an angle that the chip is bent, either by lifting or depressing, or both, shortly after it has left the tool, to an extent beyond its breaking point. In order to employ the chip lifter most efficiently for the purpose of relieving the top slope of the cutting tool, the writer has preferred to use a chip breaker which depended on depressing the chip after it passed over the chip lifting incline. A breaker of this kind breaks the chip in lengths varying from ½ to 3 inches.

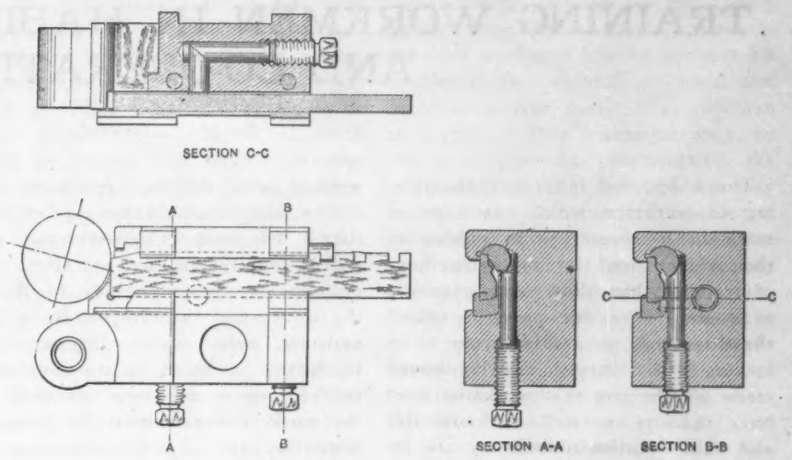


FIG. 13—DETAILS OF TURNING TOOL SHOWING MEANS OF HOLDING CUTTER AND LIMITING THE OSCILLATION.

Conclusions.

The no-clearance cutter relieves the edge from the one-sided pressure. It prolongs the life of the cutter by allowing abrasion on its face without producing negative clearance. It prevents lateral quivering. It converts the lip angle into cutting angle, which for a tool of given form constitutes a gain of from 5 to 10 degrees in cutting angle. It has extended the working range of the side tool which gives the minimum separating stress. It has made possible the use of acute-angled tools which reduce the cutting stress, thereby increasing the output of machines which have been limited by lack of pulling power. The reduction of the cutting and separating stresses has increased the accuracy (or output, which is generally interconvertible with accuracy) on nearly all lathe work. This reduction also increases the output which has been limited mostly by the frailness or the slenderness of the work.

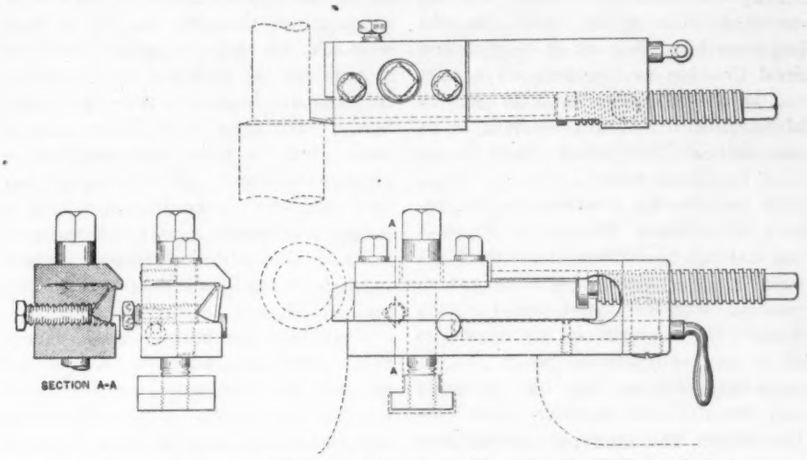


FIG. 12—FORM OF TURNING TOOL AND HOLDER FOR ENGINE LATHE.

A NEW LINE OF GAS ENGINES.

The Bruce-Meriam-Abbott Co., Cleveland, has added to its regular line of two-cylinder gas engines a vertical four-cylinder type, built for the close regulation needed in electrical work. The most notable feature about this new type of engine is the ignition system. This adheres to the high tension jump-spark system of ignition, and the cylinders have been arranged so that there are two spark plugs on each. A complete duplicate system of coils, commutators and wiring has been supplied, so that the two plugs are fired simultaneously, thereby reducing to a minimum the possibility of shut-down due to fouling of the plugs. Both plugs are inserted in a horizontal position in the path of the incoming cool gases, which has a tendency to clean them.

The shaft of the engine is forged from a single billet of steel, with the two inner cranks opposed to the two outer cranks. The timing of the cylinders is arranged to obtain one impulse at one crank at each half revolution. The shaft runs in babbit metal bearings, all of which are provided with wedges for adjustment with points for calibration to facilitate the lining up of the shaft at any time that it may be necessary. In a recent test under practically the same conditions as would exist in the course of an ordinary day's run, an overload capacity of 34 per cent was obtained on an engine without any ill effects resulting. The engine under this overload ran within the limitations of 2 per cent regulation from no load to full load.

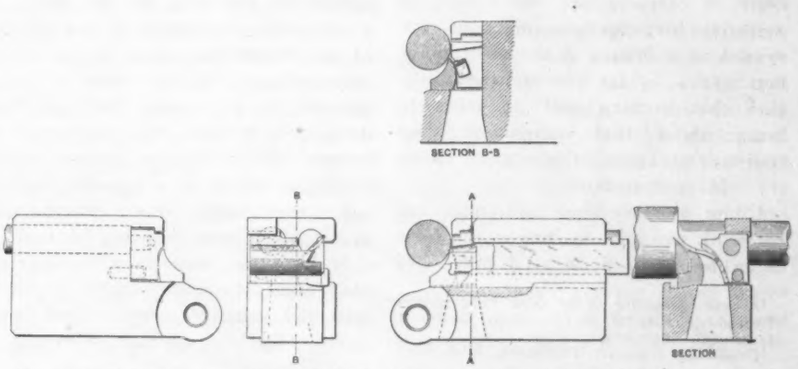


FIG. 14—SCHEME FOR CHIP BREAKER FOR A COMPARATIVELY STRAIGHT CHIP.

TRAINING WORKMEN IN HABITS OF INDUSTRY AND CO-OPERATION[1]

By H. L. Gantt.[2]

The widespread interest in the training of workmen which has been so marked for several years is due to the evident need for better methods of training than those now generally in vogue. The one point in which these methods as a class seem to be lacking is that they do not lay enough stress on the fact that workmen must have industry as well as knowledge and skill. Habits of industry are far more valuable than any kind of knowledge or skill, for with such habits as a basis, the problem of acquiring knowledge and skill is much simplified. Without industry knowledge and skill are of little value, and sometimes a great detriment.

If workmen are systematically trained in habits of industry, it has been found possible, not only to train many of them to be efficient in whatever capacity they are needed, but to develop an effective system of co-operation between workmen and foremen. This is not a theory, but the record of a fact.

It is too much to hope, however, that the methods about to be described will be adopted extensively in the near future, for the great majority of managers, whose success is based mainly on their personal ability, will hesitate before adopting what seems to them the slower and less forceful policy of studying problems and training workmen; but should they do so they will have absolutely no desire to return to their former methods. The general policy of the past has been to drive, but the era of force must give way to that of knowledge, and the policy of the future will be to teach and to lead, to the advantage of all concerned. The vision of workmen in general eager to co-operate in carrying out the results of scientific investigations must be dismissed as a dream of the millennium, but results so far accomplished indicate that nothing will do more to bring about that millennium than training workmen in habits of industry and co-operation.

Under this system each man has his work assigned to him in the form of a task to be done by a prescribed method with definite appliances and to be completed within a certain time. The task is based on a detailed investigation by a trained expert of the best methods of doing the work; and the task setter, or his assistant, acts as an instructor to teach the workmen to do the work in the manner and time specified. If the work is done within the time allowed by the expert, and is up to the standard for quality, the workman receives extra compensation in addition to his day's pay. If it is not done in the time set, or is not up to the standard for quality, the workman receives his day's pay only.

This system, in connection with the other work of F. W. Taylor, so greatly increased the output and reduced the cost of the work in the large machine shop of the Bethlehem Steel Co. that for the past seven years the writer has given a large portion of his time to the development of its possibilities. The results have far exceed his expectations.

In his closing remarks on the paper, "The Bonus System of Rewarding Labor," the writer emphasized the value of the system as a means of training workmen, and the late Dr. Robert H. Thurston in his discussion of it was so optimistic as to the results it would produce on "workmen and foremen and employer alike" that the writer felt that his enthusiasm over a new and promising method had carried him, perhaps, a little too far. Results have fully justified Dr. Thurston's predictions, however, for today the method has been developed as a practical system of education and training for all, from the highest to the lowest. The fact, so repeatedly emphasized by Mr. Taylor, that tasks should be set only as the result of a scientific investigation, has proven of an educational value hardly to be overestimated, for the scientific investigation of a process that has been developed without the assistance of science almost always reveals inconsistencies which it is possible to eliminate, thus perfecting the process and at the same time reducing its cost.

It is this scientific investigation that points to improvement in methods and educates owners and managers; but the average workman is interested only in his daily wage and has no special desire to learn improved methods. The results of our investigations are of little practical value, therefore, unless we can first teach our workmen how to use them, and then can induce them to do as they are taught.

Practical Application.

For this purpose an instructor, a task and a bonus have been found most useful. People as a rule prefer to work at the speed and in the manner to which they have been accustomed, but are usually willing to work at any reasonable speed and in any reasonable manner, if sufficient inducement is offered for so doing, and if they are so trained as to be able to earn the reward. In carrying out this plan we try to find men who are already skilled and able to perform the task set. It frequently happens, however, that the number of such men is insufficient and it takes time to train the unskilled to a proper degree of efficiency; but with a bonus as an incentive, and a proper instructor, a very fair proportion of the unskilled finally succeed in performing a task that was at first entirely beyond them.

Unskilled workmen, who under these conditions have become skilled in one kind of work, readily learn another, and soon begin to realize that they can, in a measure at least, make up for their loss in not having learned a trade. As they become more skilled, they form better habits of work, lose less time and become more reliable. The task with a reward for its accomplishment produces this interest and holds the attention, with the invariable results of more work, better work and better satisfied workers.

The Task and Bonus method of training not only furnishes the workman with the required knowledge, but by offering an inducement to utilize that knowledge properly, trains him in proper habits of work.

Habits of Work.

In all work both quantity and quality must be considered, and our task method demands a maximum quantity, all of which must be up to the standard for quality. Workmen trained under this method acquire the habit

[1] A paper presented at the New York meeting (December, 1908) of the American Society of Mechanical Engineers.

[2] Consulting engineer, Pawtucket, R. I.

of doing a large amount of work well, and disprove the oft-repeated fallacy that good work must be done slowly. As a matter of fact, our quickest workers almost always do the best work when following instructions.

Habits of work in a mechanic are comparable with habits of thought in an engineer, and our industrial schools should make proper habits of work the basis on which to build their training in manual dexterity. The engineering school does not make engineers, but tries to furnish its graduates with an equipment that will enable them to utilize readily and rapidly their own experience and that of others. In the same manner, industrial training schools should equip their graduates with habits of industry that will make them as mechanics capable and willing to do a large amount of good work.

As the writer sees it, one of the most valuable assets that the graduate of a technical college or an industrial school can have is the habit of doing promptly and to the best of his ability the work set before him. With this habit and reasonable intelligence he can make good progress. This habit is one of the first results of the Task and Bonus system, for it is a noticeable fact that task workers form habits of industry which they maintain even when on day's work with no bonus in sight.

In all schemes for technical or industrial education or training that the writer has seen, emphasis has been laid on the importance of knowing how. The writer wishes to add that ability and willingness to do are of at least equal importance. Many skilled workmen make their skill an excuse for slow work, and unless when they are taught how to do they are also taught to do efficiently, they never attain the success that should be theirs.

Under our task system the workman is taught how and trained to do at the same time. Knowing and doing are thus closely associated in his mind, and it is our experience that the habit of doing efficiently what is laid out for him becomes so fixed that he performs without hesitation tasks at which a man not trained to follow instructions would absolutely fail. This is exactly what should be expected and means nothing more than that in our industrial army the workman who has gained confidence in his superior follows his orders without hesitation.

The first essential for a workman to become successful under our task system is to obey orders, and having acquired this habit he soon finds out that a skilled investigator can learn more about doing a piece of work than he knows "off hand." Having satisfied himself on this point, he goes to work at the tasks set him with the determination to earn his bonus, with the result, if he has the natural ability, that he soon becomes a rapid and skillful workman.

Learning to obey orders is often the hardest part of the workman's task, for a large percentage of men seem so constituted as to be apparently unable to do as they are told. As a rule, however, this is a feature of a certain stage of their development only, which under proper conditions they overcome at a later date. For instance, many very capable men who were impatient of restraint when they should have learned a trade, find themselves at the age of 25 or less in the class of unskilled workmen, although their ability would have enabled them to do well at almost any trade. It is this class of men, when they have come to realize the difference between a skilled workman and one not skilled, that furnishes us with many of our best task workers. Such men often see in the instructor, task, bonus, a chance to redeem some of their earlier errors, and by learning thoroughly how to do, and doing one thing after another, in the best way that can be devised, get in a short time a training that does much to make up for the previous neglect of their opportunities.

Bosses as Servants and Teachers.

In a shop operated on this system, where each workman has his task, one man whom we term a gang boss usually tends a group of workmen, supplying them with work and appliances and removing the work when finished. Such a man is paid a bonus for each workman who earns a bonus, and an extra bonus if all of his group earn their bonuses. The result is that so long as the workmen perform their tasks, though nominally their boss, he is really their servant, and becomes the boss only when a workman fails to perform his task. The loss of money to the gang boss in case a workman fails to earn his bonus is such that he constantly has his eye on the poor workman and helps him all he can. If, however, he finds that the workman is incapable of being taught, he uses his influence to have a better man put in his place.

In starting a shop on task work, an instructor who is capable of teaching each workman how to perform his task must be constantly on hand, and must as a rule teach one workman at a time. This instructor may be the man who has investigated the work and set the task, or he may simply be an instructor capable of following out the work of such an investigator, but he must be readily available as long as any of the workmen need his services, for we make it a rule not to ask a man to do anything in a certain manner and time unless we are prepared to show him how to do it as we specify.

Task Setting.

A task must always be set for performing a definite operation in a specific manner, a minimum time being set for its accomplishment. As compensation, the workman is paid for the time set plus a percentage (usually 20 to 50) of that time, provided the work is done in the time allowed or less. If the time taken is more than the time allowed, the workman gets his day's pay only. The fact that in setting the task the manner of performing the operation is specified enables us to set another task for the same operation if we develop a better or quicker method.

If after having performed his task a workman wishes to suggest a quicker or better method for doing the same work, he is given an opportunity if possible to demonstrate his method. If the suggested method really proves to be quicker or better, it is adopted as the standard, and the workman is given a suitable reward. No workman, however, is allowed to make suggestions until he has first done the work in the manner and time specified.

It is the duty of the investigator to develop methods and set tasks, and unless the methods developed by him are generally a great deal better than those suggested by the workmen, he is not retained in the position.

Inasmuch as, after a satisfactory method has been established, a large proportion of the work of the task setter is the study of the time in which operations can be performed, he is popularly known as the time study man. This term has led to a misconception of his duties and has caused many honest people to claim that they were putting in our methods when they have put a stop watch in the hands of a bright clerk and told him to find out how quickly the

best men were doing certain work. Unquestionably they have in many cases been able to set more accurate piece rates by this method than they had been able to set by the older methods, but they are still far from our ideal, in which the best expert available investigates the work, standardizes the appliances and methods and sets a task that involves utilizing them to their very best efficiency. While the stop watch is often used to establish a method, it is used to determine the time needed to do the work only when the standard methods and appliances are used efficiently. Stop watch observations on work done inefficiently or with ill-adapted appliances, or by poor methods, are absurd and serve only to bring into disrepute all work in which the stop watch is used. Moreover, such use of the stop watch justly excites the contempt and opposition of the workman.

To make real and permanent progress, the expert must be able to standardize appliances and methods and write up such instructions as will enable an intelligent workman to follow them. Such standards become permanent, and if the workman is paid a proper bonus for doing the work in the manner and time set, he not only helps maintain the standards, but soon begins to exert his influence to help the progress of standardization.

Standardization.

All work, and all knowledge, for that matter, may be divided into two classes: Expert and Standard. Expert knowledge may be described as that which has not been reduced to writing in such a manner as to be generally available, or exists only in the minds of a few. By analogy, expert work is work, the methods of doing which either are known only to a few or have not been so clearly described as to enable a man familiar with that class of work to understand them. On the other hand, standard methods are those that are generally used, or have been so clearly described and proved that a man familiar with that class of work can understand them and safely employ them.

The largest problem of our expert is to standardize expert methods and knowledge. When a method has been standardized, a task may be set, and by means of an instructor and a bonus a method of maintaining that standard permanently may be established. With increasing efficiency on the part of the workman the standard always has a tendency to become higher.

We have here the workman and the foreman using their efforts to maintain standards, for both fail to obtain a bonus if the standard is not maintained. This is so different from the case in which the standard is maintained only by the man in authority with a club that there can be no comparison.

From workmen trained under these methods, we get a good supply of instructors and foremen, and occasionally an investigator. From our investigators, who standardize our methods and appliances, we get our superintendents, and our system of management thus becomes self-perpetuating. The superintendent who believes that the sovereign cure for all troubles is to go into the shop and raise a row, has no place under our methods, for when the task and bonus has been established, errors are far more frequent in the office than in the shop, and the man who is given to bluffing soon finds that his methods produce no effect on men that are following written instructions.

Obstacles.

Among the obstacles to the introduction of this system is the fact that it forces everybody to do his duty. Many people in authority want a system that will force everybody else to do his duty, but will allow them to do as they please. The Task and Bonus system when carried out properly is no respecter of persons, and the man who wishes to force the workman to do his task properly must see that the task is properly set and that proper means are available for doing it. It is not only the workman's privilege, but his duty, to report whatever interferes with his earning his bonus, and the loss of bonus soon educates him to perform this duty no matter how disagreeable it is at first. We investigate every loss of bonus, and place the blame where it belongs. Sometimes we find it belongs pretty high up, for the man who has neglected his duty under one system of management is pretty apt to neglect it at first under another. He must either learn to perform his duty or yield his place, for the pressure from those who lose money by his neglect or incompetence is continuous and insistent.

This becomes evident as soon as the task and bonus gets fairly started and the effect is that opposition to its extension develops on the part of all who are not sure of making good under it, or whose expert knowledge is such that they fear it will all soon be standardized. The opposition of such people however is bound to give way sooner or later, for the really capable man and the true expert welcome these methods as soon as they understand them.

Helps.

The fact that the task and the bonus enable us to utilize our knowledge and maintain our standards, and that the setting of tasks after a scientific investigation must necessarily not only increase our knowledge but standardize it, brings to our assistance the clearest thinkers and hardest workers in any organization. Our greatest help, however, comes from the workmen themselves. The most intelligent soon realize that we really mean to help them advance themselves, and the ambitious ones welcome the aid of our instructor to remove obstacles that have been in their way for perhaps years. As soon as one such man has earned his bonus for several days, there is usually another man ready to try the task, and unless there is a great lack of confidence on the part of the men in the management, the sentiment rapidly grows in favor of our task work.

Day Work and Piece Work.

As used by the writer, the task and bonus system of pay is really a combination of the best features of both day and piece work. The workman is assured his day rate while being taught to perform his task, and as the bonus for its accomplishment is a percentage of the time allowed, the compensation when the task has been performed is a fixed quantity, and is thus really the equivalent of a piece rate. Our method of payment then is piece work for the skilled, and day work for the unskilled, it being remembered that if there is only work enough for a few, it will always be given to the skilled. This acts as a powerful stimulus to the unskilled, and all who have any ambition try to get into the bonus class. This cannot be too clearly borne in mind, for we have here all the advantages of day work combined with those of piece work without the disadvantage of either, for the day worker who has no ambition to become a bonus worker usually of his own accord seeks work elsewhere, and our working force soon becomes composed of bonus workers, and day workers who are trying to become bonus workers.

Co-operation.

When 25 per cent of the workers in a plant are bonus workers, they, with those who are striving to get into their class, control the sentiment, and a

strong spirit of co-operation develops. This spirit of co-operation in living up to the standards set by the experts, which is the only way a bonus can be earned, benefits the employer by the production of more, better and cheaper work. It benefits the workmen by giving them better wages, increased skill, better habits of work and more pleasure and pride in their work.

The fact that we get better work as well as quicker work seems inconceivable to some. The reasons are: *a* Careful inspection, for no bonus is paid unless the work is up to the standard; *b* Work done by a prescribed method, and always in the same way; *c* Attention needed to do high speed work, which keeps the mind of the worker on what he is doing and soon results in exceptional skill.

The development of skilled workmen by this method is sure and rapid, and wherever the method has been properly established, the problem of securing satisfactory help has been solved. During the past few years while there has been so much talk about the "growing inefficiency of labor," the writer has repeatedly proved the value of this method in increasing its efficiency, and the fact that the system works automatically when once thoroughly established, puts the possibility of training their own workmen within the reach of all manufacturers.

Training Help a Function of Management.

Any system of management that did not make provision for obtaining proper materials to work with would be thought very lax. The day is not far distant when any management that does not make provision for training the workmen it needs will not be regarded as much better, for it is by this means only that a system of management can be made permanent.

To be satisfied to draw skilled workmen from the surplus of other plants means as a rule that second rate men only are wanted, and indicates a lack of appreciation of the value of well trained, capable men. The fact that few plants only have established methods of training workmen does not necessarily mean that the managers are satisfied with that condition, but rather that they know of no training system that can be satisfactorily operated in their plants, and as questions are sure to be asked about the method of introducing this system, a few words on that subject may not be amiss, it being borne in mind that the changing of a system of management is a very serious matter, and cannot be done by a busy superintendent in his spare time.

Method of Introduction.

In order to set tasks we must know beforehand what work is to be done and who is to do it. In order to pay a bonus, we must know after the work is done whether it was done exactly as specified. Hence our first care in starting to introduce this method is to provide means for assigning tasks to the workmen, and means for obtaining such a complete set of returns as will show just what each man has done. When this much has been introduced, the output of a plant is always increased and the cost of manufacture reduced.

The next step is to separate such of the work as is standard, or can be readily made standard, from the more miscellaneous work, and set tasks for the standard work. Then we begin to standardize, and as fast as possible reduce the expert and increase the routine work. The effort to classify and standardize expert knowledge is most helpful to the experts themselves, and in a short time they begin to realize that they can use their knowledge far more efficiently than they ever dreamed.

As soon as work has been standardized, it can be intelligently planned and scheduled, each workman being given his specific task, for which he is paid a bonus when it is done in the manner and time specified. As bonus is paid only on the written statement of the inspector that the whole task has been properly done, failure to earn a bonus indicates that our plans have not been carried out.

An investigation of every case of lost bonus keeps the management closely in touch with the progress of the work, and as the workmen are ever ready to help disclose and remove the obstacles that prevent their earning their bonus, the managing problem is greatly simplified.

Moral Training.

The fact that under this system, everybody, high and low, is forced by his co-workers to do his duty, for some one else always suffers when he fails, acts as a strong moral tonic to the community, and many whose ideas of truth and honesty are vague find habits of truth and honesty forced upon them. This is the case with those in high authority as well as those in humble positions, and the man highest in authority finds that he also must conform to laws, if he wishes the proper co-operation of those under him.

Mattie stack at Girard, O., of the Girard Iron Co., blew in Nov. 7.

A NEW ELECTRIC FURNACE FOR ANNEALING AND TEMPERING.

To secure the best results in the process of annealing and hardening it is necessary to have a constant temperature in the furnace. The ordinary coal and gas furnaces do not altogether fulfill this requirement on account of the large furnace area exposed to the air for radiation. Again, to obtain the best results it is often necessary to adjust the temperature of the furnace, and this, it is claimed, cannot be done with any precision with the gas furnace. Realizing these facts, it is but natural that tool producers and manufacturers in general should look forward to the day when a hardening furnace would be designed that might assure them better results in a shorter time than is possible with the present methods.

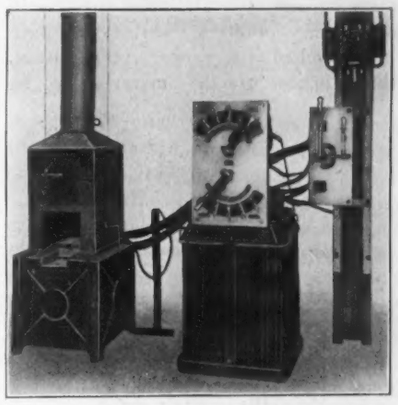


FIG. 1—ELECTRIC ANNEALING AND TEMPERING FURNACE WITH CONNECTIONS.

In the new type of electric furnace now being manufactured by the General Electric Co., Schenectady, N. Y., for operation on alternating current circuits, metallic salts are reduced to a liquid state by means of an electric current. It can be readily seen that as soon as these salts reach a liquid condition the temperature can be easily regulated by varying the amount of current passing through the bath. By this method of regulation, any temperature will remain uniform throughout the bath except at the surface, where it is slightly lower, due to radiation. This applies, however, to a depth of 0.6 to 0.75 inch.

In Fig. 1 is shown an electric furnace outfit as it is installed in the die department of the Schenectady works of the above company. The outfit, as can be seen, consists of the furnace, with its hood suspended from above; the regulating transformer with regulating switch; the switchboard with the necessary ammeter and voltmeter;

the incoming line with fuses. The regulating switch is provided with a sufficient number of contact points to give, as stated before, almost any desired temperature between the limits of 250 to 1,350 degrees Cent.

The furnace, a sectional view of which is shown in Fig. 2, consists of a fire clay crucible surrounded by an insulating material, usually of asbestos, which rests in a fire clay box, all being supported by an enclosing case of iron. Two suitable electrodes, connected to the low tension side of the transformer, are placed on each side of the crucible and are in direct contact with the bath at all times.

To start up the furnace an arc is started across the broken flux by means of an auxiliary electrode and in a very short time the solid mass is in a molten condition. After the bath has reached its proper temperature, that portion of the material to be

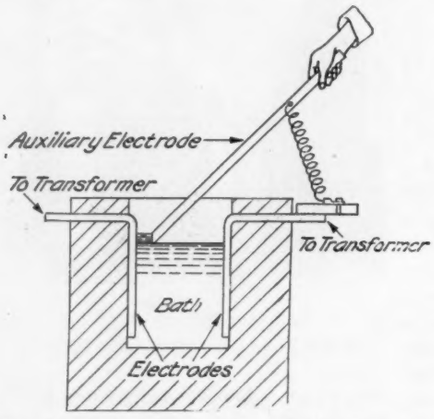


FIG. 2—SECTION OF ELECTRIC ANNEALING AND TEMPERING FURNACE.

hardened is placed entirely in the liquid bath, and is allowed to remain there until it attains the same color as the bath, when it is removed and tempered in water or oil, as the case may be.

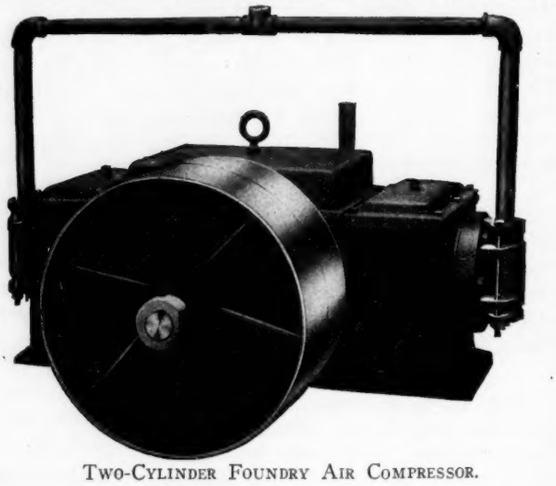
The bath for hardening or annealing completely fills the crucible, and in the Schenectady factory consists of equal portions of barium and potasium chloride. The ultimate temperature depends on the relative proportions of the two chlorides, the higher the percentage of barium chloride, the higher the temperature may be carried. In addition to hardening, the furnace may be used for softening tempered steel, the bath being maintained at a temperature of about 250 degrees Cent. for this work.

In summing up the advantages of this type of electric furnace, the following may be mentioned: There is no chance for oxidation, for the material while being heated does not come in contact with the air. All parts of the tool are subjected to the same degree of heat at all times, thus preventing any possibility of strains or overheating. There is practically no danger from fire as the outer walls of the furnace are never hot. Owing to its simplicity, it can be operated by an ordinary workman. The metallic salts have no effect on the composition of the steel and the operator never comes in contact with dangerous fumes.

A COMPACT AIR COMPRESSOR FOR FOUNDRY SERVICE.

The accompanying illustration shows a 4 x 4-inch air compressor patented and built by Geo. S. Comstock, Mechanicsburg, Pa. The compressor, which is designed for foundry use, is of the two-cylinder, center-crank, belt-driven type. The main frame is a single casting embracing both cylinders, which are water-jacketed, the crank shaft bearings and the crank case. The splash system of lubrication is used, and a heavy flywheel serves as a fast pulley.

The inlet and outlet valves are drop forgings ground to size in removable cages. These latter together with the valves can be removed in a few minutes for examining or regrinding. The capacity of the machine is 11 cubic feet of free air at 200 revolutions per minute and at 180 revolutions per minute it will drive a 2½-inch chipping hammer of approved design, or two smaller hammers, using air at 60 to 80 pounds. When necessary, however, the compressor will operate at 200 revolutions per minute. The machine weighs 500 pounds, and is complete in itself. Its length over all is 39 inches and total width 31 inches.



TWO-CYLINDER FOUNDRY AIR COMPRESSOR.

THE TRUAX AUTOMATIC ORE CAR.

The Globe Iron Works, Stockton, Cal., has placed on the market a line of ore cars especially designed for western service. The cars are regularly built in two styles, end dumping and side dumping. The end dumping cars have turntables, enabling them to be dumped in any position. They are constructed entirely of metal, while the side dumping cars are of metal except the wooden truck beams.

Cast iron wheels with chilled treads and flanges are used on both types of cars. The wheels are provided with an annular space surrounding the axle, serving as an oil reservoir, making the journal practically self-oiling.

The trucks of the end dumping cars are of steel plates. Wooden beams, reinforced at the ends with steel plates are used for the trucks of the side dumping cars. Both the end dumping and side dumping types are provided with automatic opening and closing doors, which are hinged at the top. The construction is such, however, that there is no hinge rod across the top of the car, which is left free from obstruction, permitting the carrying of timbers and similar material. The doors are fastened by two latches on either side of the car, the latches being formed on one end of a bell crank lever. The opposite side of the lever is fastened to a long link which rotates on a fixed pivot fastened to the trucks. As the car body swings forward, the link moves downward lifting the door latches. The door does not begin to open until the car body is tipped 4 degrees and does not fully release until the body has reached an angle of 12 degrees from the horizontal. On account of the entire body of ore being held until the car is partially dumped, the weight of the load helps in tilting the car.

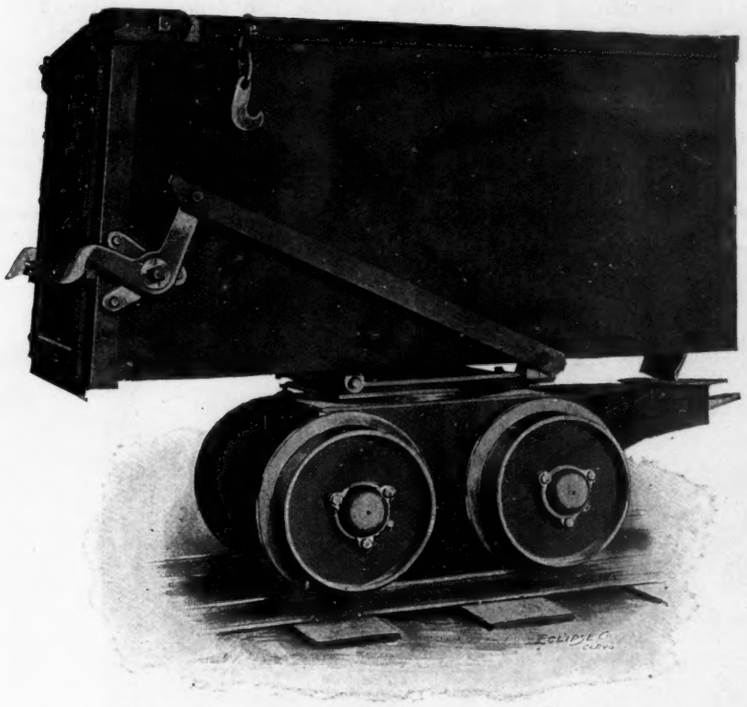


FIG. 1—TRUAX AUTOMATIC END DUMPING ORE CAR.

After dumping the door returns to the original position and is automatically locked in place.

Each of the side dumping cars is fitted with a patent rail grab, which automatically grasps the rail firmly as the car is being dumped, which prevents upsetting while unloading. The bodies of all cars are constructed of sheet steel, reinforced with bands and angles. The end dumping cars are built in sizes ranging from 13 to 30 cubic feet capacity; the side dumping cars from 25 to 60 cubic feet capacity.

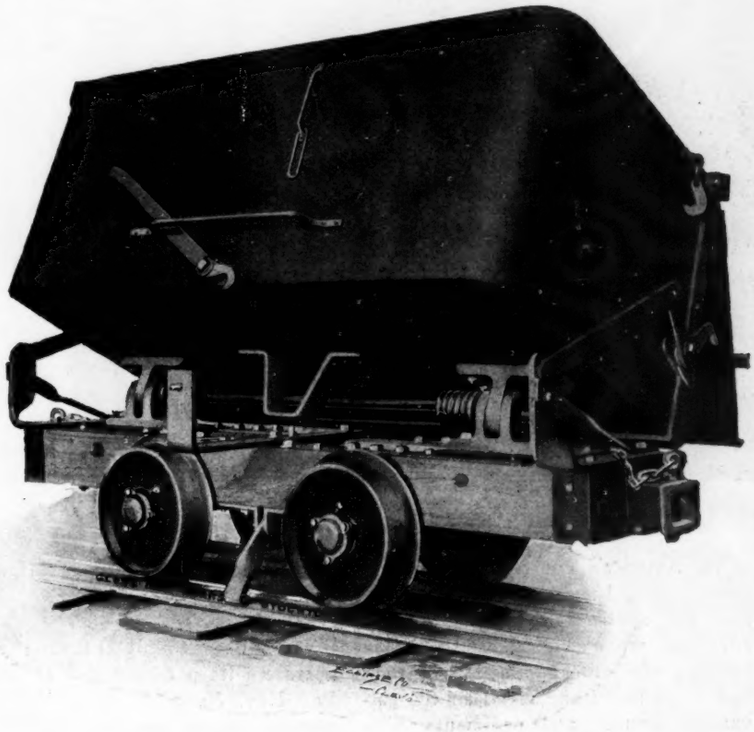


FIG. 2—TRUAX AUTOMATIC SIDE DUMPING ORE CAR.

SOME NIAGARA PNEUMATIC APPARATUS.

The accompanying illustrations show two devices placed on the market by the Niagara Device Co., Buffalo, for sand blast work and for spraying paint by means of air, respectively. The essential feature in both cases is the "gun," so called, used as a nozzle for the sand blast or paint spray. This is shown in the accompanying

FIG. 1—NIAGARA SAND BLAST NOZZLE.

illustration. An air line under pressure is connected to the nozzle at the point shown, and the sand is siphoned direct from the ground or from a pit, pail or barrel, as may be most convenient. The sand once used may be sifted and used over and over again. The device is fitted for 1¼-inch hose connections and uses sand which has been sifted through a screen of ⅛-inch mesh. In operation the suction hose should not be over 5 feet in length and should have a weight to hold the end of the hose in position. Should the machine for any reason become clogged, it may be instantly cleared by closing the outlet of the nozzle by pressing it against

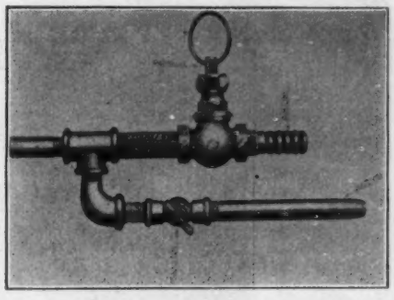


FIG. 2—NIAGARA PAINT SPRAY NOZZLE.

a firm surface, and then turning on the air. The air is backed up through the sand hose and removes any material that has become lodged there. The device when used for painting operates with success on any liquid weighing up to 18 pounds per gallon. By its use a steel car of 50 tons capacity can be painted complete with one coat in one-half hour. In connection with the above apparatus, this company furnishes to shops not

equipped with compressed air the "Niagara" pneumatic system for furnishing air for these machines.

SHEET METAL IN BUILDING CONSTRUCTION.

With the increasing cost of materials formerly employed, and the more rigorous exactions of the insurance authorities, sheet metal has gained a considerable prominence in building and house equipment. The present extensive adoption of sheet metal has been a gradual one, the interesting point being the widely different purposes and the common occurrence of different metals in sheet form. The fire resisting qualities of metal coverings have also had considerable to do with the development of the building sheet metal business.

A notable example of the architectural effect produced by the use of sheet metal in building construction is shown in the accompanying illustrations, from photographs of the plant of the American Tool Works Co., Cincinnati. Fig. 1 shows the old plant before the application of sheet metal covering, while Fig. 2 is the same building after the application of rock face brick and stone metal siding, galvanized cornice and pediments, window gaps, etc., making a handsome, durable and fire-proof covering at a comparatively small cost.

The metal covering was manufactured from open hearth steel, painted and galvanized to imitate rock face stone and brick. The underwriters gave this siding the same fire insurance rate as brick and stone.

The work was done and the covering furnished by the Edwards Mfg. Co., Cincinnati.

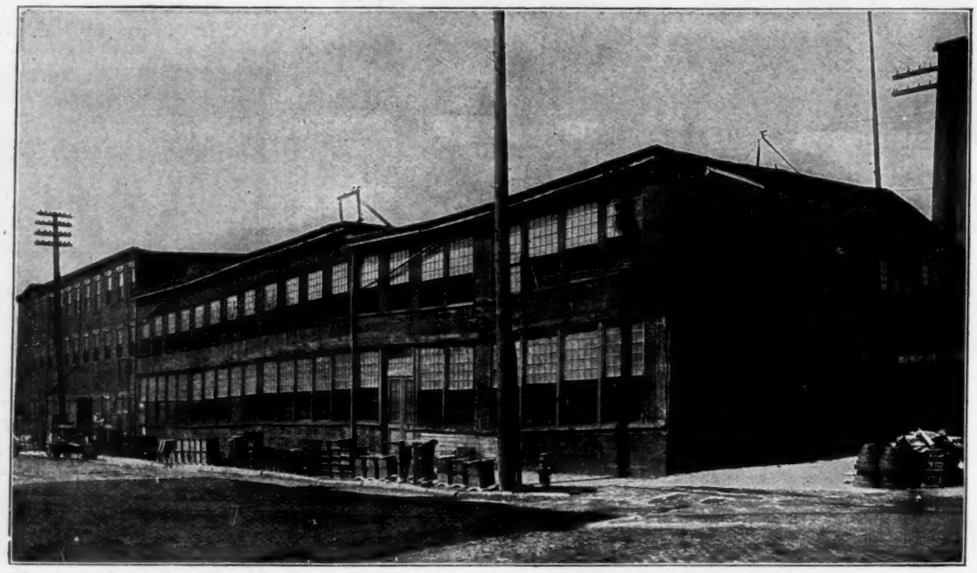


FIG. 1—AMERICAN TOOL WORKS PLANT BEFORE METAL SHEATHING WAS APPLIED.

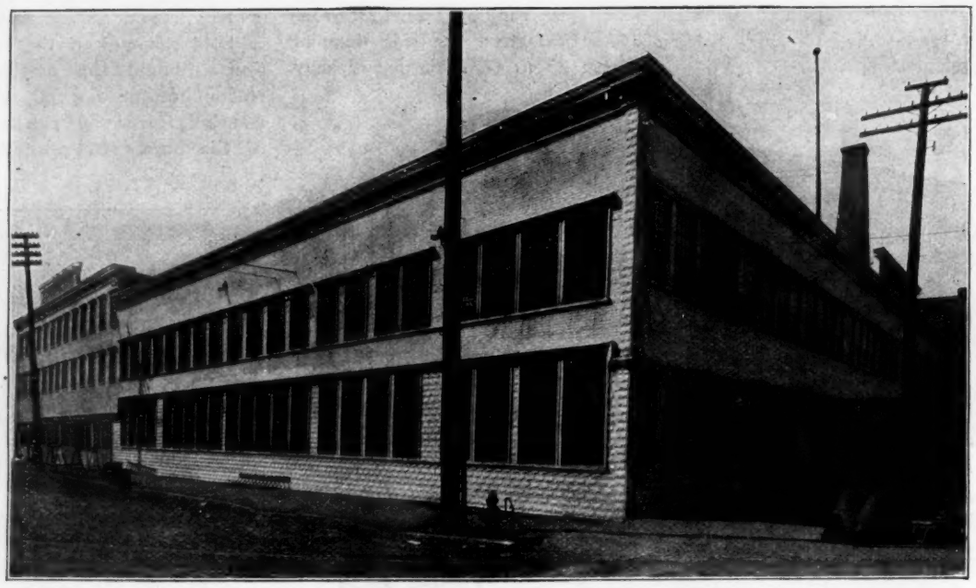


FIG. 2—AMERICAN TOOL WORKS PLANT WITH METAL SHEATHING.

The Wilkes Rolling Mill Co. resumed operating its puddling mill at Sharon, Pa., Nov. 30, after being idle many months. It is said the finishing department will start later.

THE ALLIANCE COMBINED STRIPPING AND CHARGING CRANE.

The combined stripping and charging crane illustrated herewith, serves, as its name indicates, the double purpose of stripping the molds from the ingots and also charging the ingots into soaking pits, or reheating furnaces, and of course drawing the ingots from the soaking pits and delivering them into an ingot buggy or chariot, or else placing them directly on the roller table of the blooming mill.

Heretofore it has been customary in most steel plants to provide two sets of apparatus for this purpose (many plants having a separate building for the stripper) requiring two crews of men to operate them. The use of these two separate and independent pieces of apparatus not only is a source of considerable expense, but entails undesirable necessities and installations.

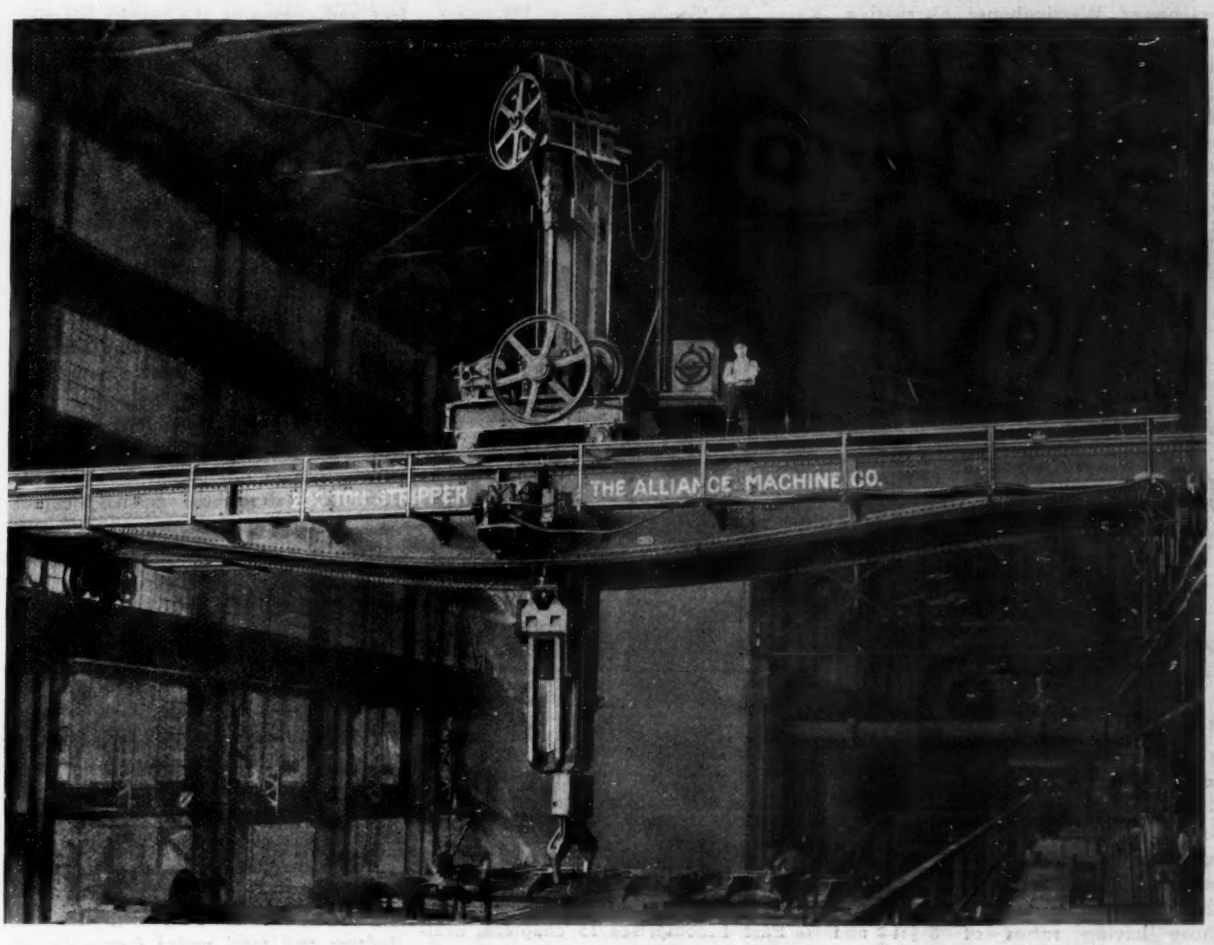
A further and more important objection to the use of separate apparatus resides in the fact that considerable time is necessarily lost between the stripping of the mold from the ingot and the placing of the ingot in the soaking pit, due to the necessary shifting and switching of the ingot carrying cars. During this time the stripped ingots lose a great amount of heat, which, as is well known, is a decided disadvantage.

The combined crane consists of a standard traveling crane bridge provided with a special trolley carrying two independent and vertically movable columns. One of these columns carries all the necessary mechanism for stripping the ingots, and the other column carries the mechanism for gripping the ingot and charging it into the soaking pit. Each of these columns is operated by an independent motor, and each is ready to perform its particular function at all times.

Thus, when the stripping column has stripped the ingot, the charging column can at once be brought in play and charge the ingot into the soaking pit. The stripping column can exert a stripping pressure of 200 tons, and the charging column can readily handle ingots weighing 7½ tons; although the ingots in use weigh only 3½ tons.

Although the cranes have been in operation but a comparatively short time, they have already stripped, charged, drawn and delivered 1,100 tons of ingots in one turn.

The cut shows one of two cranes built for the new plant of the Pittsburg Steel Co., Monessen, Pa., by the Alliance Machine Co., Alliance, O., under the broad patent of J. C. Cromwell and H. W. Lash, of the Garrett-Cromwell Engineering Co.



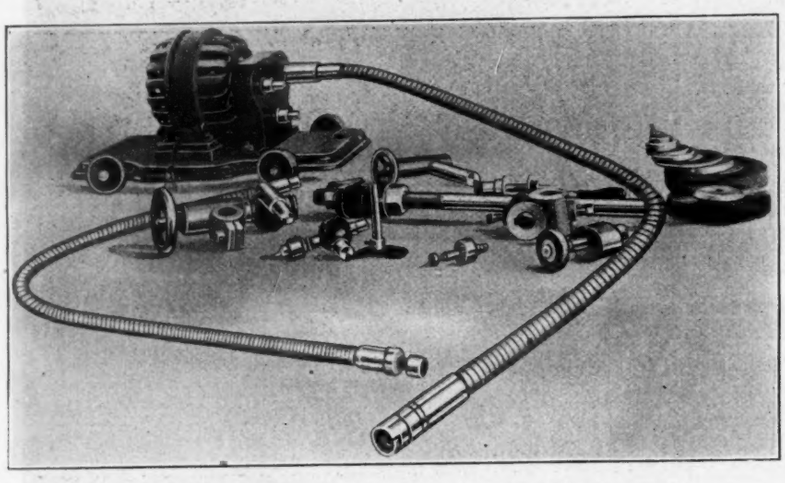
COMBINED STRIPPING AND CHARGING CRANE.

Ella stack of Pickands, Mather & Co. was blown out at West Middlesex, Nov. 23, for repairs. The stack will be relined and other improvements made.

The Ironton Iron Co. blew in its stack at Ironton, O., Nov. 22.

SMALL MOTOR-DRIVEN EMERY WHEELS, BUFFERS AND DRILLS.

The illustration herewith shows a handy motor driven flexible shaft outfit furnished the United States government by the Coates Clipper Mfg. Co., of Worcester, Mass. The equipment consists of a breast drill, drill press, emery wheels and polishers, and is provided with such necessary attachments as a multiplier, clamp, spindle, old-man, etc. The motor is a one-horsepower Westinghouse alternating current motor mounted on a portable truck, and fitted with a speed changing head and flexible shaft. The portability makes the appliance convenient for any large work, and the flexible shaft permits the operator to work



MOTOR-DRIVEN EMERY AND BUFFING WHEELS.

with ease upon otherwise difficultly accessible parts.

In order to obtain the proper cutting speeds for emery wheels of different diameters, multipliers of the proper ratios are used. The two which can be used to best advantage are those having ratios of 8½:1 and 6½ : 1, respectively; the former for use with ⅜, ½ and 1-inch wheels and the latter for 2 and 3-inch wheels. Larger sizes are used on a clamp spindle which runs at the speed of the shaft, 1,800 to 2,500 revolutions per minute.

By removing the breast plate on the drill and attaching a combination old-man, drilling up to ½-inch can be readily done. Larger drills up to 1¼-inches are used in connection with a worm feed drill press and old-man attachment.

The outfit is so arranged that a heavy or light shaft can be used according to the requirements of the work. The smaller shaft is fitted with a taper end sleeve for taking small tools, and the larger shaft with clutch sleeve and grab dog clutches, so that one tool can be used after another without making any change in the shaft.

BOOK REVIEW.

"Compressed Air Plant for Mines." By Robert Peele, professor of mining in the School of Mines, Columbia University, New York. John Wiley & Sons. 6 x 9 inches. xii + 325 pages. Illustrated. Cloth. Supplied by THE IRON TRADE REVIEW for $3.

The book forms a valuable addition to the literature dealing with compressed air. While its title indicates that it is confined to a special field, it nevertheless contains much general information on the subject of air compression and utilization of compressed air. It is divided into two general parts, entitled, respectively, "Production of Compressed Air" and "Transmission and Use of Compressed Air."

Part I comprises 15 chapters, dealing with various types of machines, the theory of the compression of air and the operation of air compressors. Chapter III takes up isothermal and adiabatic compression and modes of absorbing the heat in compression. Wet compressors and hydraulic plunger and injection compressors are discussed in Chapter IV, which also takes up the quantity of injection water required. The remaining chapters of Part I deal in part with compound air compression, detailing the theory, operation and details of the mechanism required, giving data on the performances of air compressors, standards of rating and methods of calculating horsepower. A chapter is devoted to air compression at high altitudes and discusses the effects of altitude on the operation of machines. Explosions in compressors and receivers are discussed and precautions for preventing these explosions are given. The last chapter of Part I takes up air compression by the direct action of falling water, and describes various plants which are in operation.

Part II, comprising Chapters XVI to XXIII, takes up the conveyance of compressed air in pipes, discusses the various formulae governing this subject and compares the results of current formulae. Another chapter considers compressed air engines and their working at full pressure or with partial or complete expansion. Curves for piston clearance, etc., are given and calculations of the volume of free air required are discussed. Other chapters discuss the questions of the freezing of moisture in compressed air and the subject of reheating, detailing in each case the various forms of apparatus required. Another chapter discusses rock drills, their work, character and operation. Mine pumps are similarly treated, and also pumping by the direct action of compressed air. The last chapter of the book is devoted to compressed air haulage for mines and describes various locomotives, charging apparatus and calculations of motive power. Examples of compressed air haulage plants are also given.

Extensive Building Program.—At the last meeting of the board of directors of the Buckeye Steel Castings Co., Columbus, O., the construction of two new steel buildings, covering a floor space 245 x 420 feet each was authorized. The work on the buildings will start early in the year. One of the structures will be occupied by the coupler department which is now in the same building with the car bolster and steel under frame departments. The space vacated by the coupler department will be utilized by the former departments. The second building will be used for general purposes. In addition to these buildings the board authorized the rebuilding of two of its furnaces, the capacity of which will be doubled. With these improvements completed the capacity of the plant will be increased about 25 per cent.

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	Closing Quo. Dec. 5	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	15⅛	+ ⅝	Sept. 3	19,820 000			
Allis-Chalmers pr	49	+ ⅛		16.150,000	7 cum	1¾ Q.	Feb., 1904
American Can	9¼	− ⅛	Feb. 3	41.233.300			
Am. Can pr	76	+ ⅛		41,233,300	7 cum	1¾ Q.	Oct., 1908
Am. Car & Foundry	46⅜	− ⅜	June 25	30,000,000		½ Q.	Oct., 1908
Am. Car & Fdy. pr	108¼	+ ¼		30.000,000	7 n. c.	1¾ Q.	Oct., 1908
American Loc	55⅛	− ⅜	Oct. 20	25.000.000	5	1¼ Q.	Aug., 1908
American Loc. pr	109½	− ⅛		25 000,000	7 cum	1¾ Q.	Oct., 1908
American Ship	57⅞	....	Oct. 14	7.60',000	4	1 Q.	June, 1908
American Ship pr	105½	.....		7,900,000	7 n c	1¾ Q.	Oct., 1908
Am. Steel Foundries. pr.	47½	+4⅜	Oct. 6	15.810 000			
Am. Steel Foundries(new	39½	− ½		14,247,400	6 cum	2½	Aug., 1 04
Barney & Smith	40	.....	June 2	2.000.000	4	1 Q.	Sept., 1907
Barney & Smith pr	110	... .		2.500 000	8 cum	2 Q.	June, 1908
Bethlehem Steel	22½	−1	April 7	14,862,000			
Bethlehem Steel pr	52	−1		14.908.000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	38⅛	− ½	March 17	45,000.000*	6	1½ S. A.	Aug., 1908
Cambria Iron	47	.....		8,468.000*	4	2 S. A.	Sept., 1908
Chicago Pneumatic Tool	25½	+ ⅛	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	40	+1¼	Oct. 19	34 235 500		3½	April, 1902
Crucible Steel	8½	− ⅛	Oct. 21	24,578 400			
Crucible Steel pr	54½	+1⅜		24,436.500	7 cum	1 Q.	Dec., 1907
Empire Steel	6	.....	Feb. 26	1,254,770			
Empire Steel pr	47	−3		2 500,000	6 cum	3 S. A.	July, 1908
Fay & Egan	90	... .	Feb. 18	1,000,000	6	1¾ Q.	Nov., 1908
Fay & Egan pr	100	.....		1,000 000	7 cum	1¾ Q.	Nov., 1908
General Electric	157½	−1½	May 12	65,167.000	8	2 Q.	Oct , 1908
Harbison-Walker	16¾	− ¼	Jan. 20	18.000 000		½	Oct., 1907
Harbison-Walker pr	80	.....		9.6 0,000	6 cum	1½ Q.	Oct. 1908
International Pump	30¼	−1½	June 2	17.787.300		1	April, 1905
International Pump pr	79⅞	+ ⅛		13,885,000	6 cum	1¾ Q.	Nov., 1908
Lackawanna Steel	50	−2	March 11	34.971.400			
Lake Sup. Corp	12⅜	− ⅛	Oct. 7	40,000,000			
New York Air Brake	94½	−1¾	June 18	8.012,500	8	2 Q.	Oct., 1907
Niles-Bement-Pond	97	.....	Feb. 5	8.500 000	6	1¾ Q.	Dec., 1908
Niles-Bement-Pond pr	100	.....		2.000,000	6 cum	1¾ Q.	Nov., 1908
Otis Elevator Co.	39	... .	March 16	6.156,600		1½ S. A.	April, 1908
Otis Elevator Co. pr	94	+1		5.449,500	6 n. c.	1½ Q.	Oct., 1908
Penn. Steel	50	.....	May 11	10.750.000			
Penn.Steel pr	104	− ½		16,500 000	7 n. c.	3½ S. A.	Nov., 1908
Pittsburg Coal Co	13⅝	+ ⅛	Feb. 10	26,853.400			Nov., 1906
Pittsburg Coal Co. pr	50	+2		27,030.800	7 c.	1¾	April, 1905
Pressed Steel Car	39	− ¾	Feb. 19	12,500,000		3	Aug., 1904
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Rep. Iron & Steel pr.	86½	−1¾		20,416.900	7 cum	1¾ Q.	April, 1908
Sloss-Sheffield	78¾	− ¾	March 11	10,000,000	5	1 Q	Dec , 1908
Sloss-Sheffield pr	109¼	.....		6.700 000	7 n. c.	1¾ Q.	Sept., 1903
U. S Pipe & Fdy	29½	+1½	June 24	12,500,000	4	1 Q	Dec., 1907
U. S. Pipe & Fdy pr	75	.....		12 500,000	7 n. c.	1¾ Q.	Sept., 1908
U. S. Steel	54¼	−2¼	April 20	508,302,500	2 n. c.	½ Q.	Dec., 1908
U. S. Steel pr	112⅝	− ⅝		360,281,100	7 cum	1¾ Q.	Nov., 1908
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Va Iron, Coal & Coke	64	−3	Nov. 17	9,078 680			
Westinghouse Elec.	89¼	−2¼	June 24	23 933.200	10	2½ Q.	Oct., 1907
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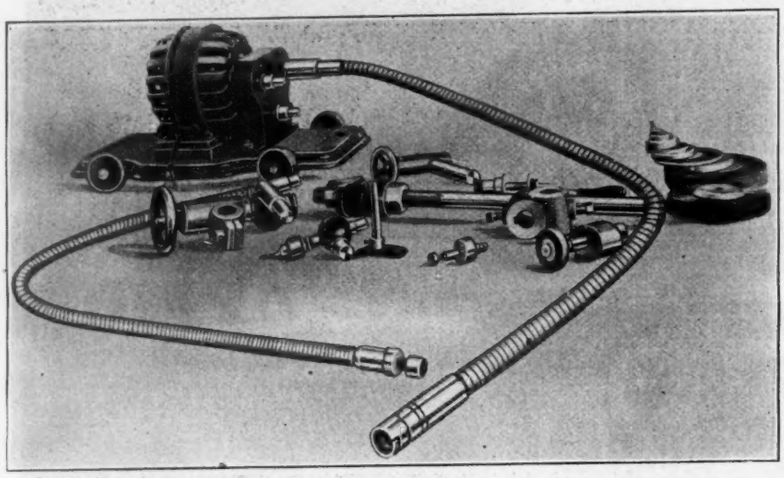
SMALL MOTOR-DRIVEN EMERY WHEELS, BUFFERS AND DRILLS.

The illustration herewith shows a handy motor driven flexible shaft outfit furnished the United States government by the Coates Clipper Mfg. Co., of Worcester, Mass. The equipment consists of a breast drill, drill press, emery wheels and polishers, and is provided with such necessary attachments as a multiplier, clamp, spindle, old-man, etc. The motor is a one-horsepower Westinghouse alternating current motor mounted on a portable truck, and fitted with a speed changing head and flexible shaft. The portability makes the appliance convenient for any large work, and the flexible shaft permits the operator to work



MOTOR-DRIVEN EMERY AND BUFFING WHEELS.

with ease upon otherwise difficultly accessible parts.

In order to obtain the proper cutting speeds for emery wheels of different diameters, multipliers of the proper ratios are used. The two which can be used to best advantage are those having ratios of 8½:1 and 6½ : 1, respectively; the former for use with ⅜, ½ and 1-inch wheels and the latter for 2 and 3-inch wheels. Larger sizes are used on a clamp spindle which runs at the speed of the shaft, 1,800 to 2,500 revolutions per minute.

By removing the breast plate on the drill and attaching a combination old-man, drilling up to ½-inch can be readily done. Larger drills up to 1¼-inches are used in connection with a worm feed drill press and old-man attachment.

The outfit is so arranged that a heavy or light shaft can be used according to the requirements of the work. The smaller shaft is fitted with a taper end sleeve for taking small tools, and the larger shaft with clutch sleeve and grab dog clutches, so that one tool can be used after another without making any change in the shaft.

BOOK REVIEW.

"Compressed Air Plant for Mines." By Robert Peele, professor of mining in the School of Mines, Columbia University, New York. John Wiley & Sons. 6 x 9 inches. xii + 325 pages. Illustrated. Cloth. Supplied by THE IRON TRADE REVIEW for $3.

The book forms a valuable addition to the literature dealing with compressed air. While its title indicates that it is confined to a special field, it nevertheless contains much general information on the subject of air compression and utilization of compressed air. It is divided into two general parts, entitled, respectively, "Production of Compressed Air" and "Transmission and Use of Compressed Air."

Part I comprises 15 chapters, dealing with various types of machines, the theory of the compression of air and the operation of air compressors. Chapter III takes up isothermal and adiabatic compression and modes of absorbing the heat in compression. Wet compressors and hydraulic plunger and injection compressors are discussed in Chapter IV, which also takes up the quantity of injection water required. The remaining chapters of Part I deal in part with compound air compression, detailing the theory, operation and details of the mechanism required, giving data on the performances of air compressors, standards of rating and methods of calculating horsepower. A chapter is devoted to air compression at high altitudes and discusses the effects of altitude on the operation of machines. Explosions in compressors and receivers are discussed and precautions for preventing these explosions are given. The last chapter of Part I takes up air compression by the direct action of falling water, and describes various plants which are in operation.

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NEWS FROM MANY INDUSTRIES

New Buyers:—

J. George Brinkman, Harry A. Ruggles, James Armstrong and others have incorporated the Engineers' Specialty Co., Kansas City, Mo., with $100,000 capital.

A charter has been granted to the Kansas City Sash Weight Mfg. Co., Kansas City, Mo., with $20,000 capital stock. The incorporators are: H. C. Shimp, Herbert C. Shimp and F. V. Shimp.

The McGrew Scale & Mfg. Co., to manufacture and deal in scales, etc., with a capital stock, fully paid, of $75,000, has been chartered by Alonzo McGrew, Andrew Black, R. E. Desmond and Harry W. Lindemann.

Ira Young, Christopher H. Frederick Jr., and H. M. Young are the incorporators of the Great Western Wire Fence & Mfg. Co., St. Louis, Mo., to manufacture and deal in wire fencing, with $20,000 capital.

The Tirrill Mfg. Co., Schenectady, N. Y., has been incorporated to manufacture electrical appliances and machinery, with a capital of $100,000. Those interested are Allen A. Tirrill, Everett E. Lucas, and Franklin W. McClellan, Schenectady, N. Y.

The Metropolitan Bridge Co., Middleburg, N. Y., general contractor, manufacturer of machinery and tools, builder of roads and bridges, with $30,000 capital stock has these incorporators: A. H. Mallery, A. M. Mallery and G. H. Walsh, Syracuse, N. Y.

The Pierson Motor Supply Co., New York City, to manufacture motors, engines, machines, automobiles, cars, wagone and boats, with $20,000 capital stock, has been chartered by F. W. Mills, H. M. Browne, E. J. Forhan, 154 Nassau street, New York City.

The Western Railway & Contractors' Supply Co., 1310 Tribune building, Chicago, has filed articles of incorporation to deal in railway and contractors' supplies, with a capital of $50,000. James F. Dagley, John F. Brems and Michael H. Powell are the incorporators.

Articles have been filed by the Continental Radiator & Foundry Co., Decatur, Ill., through Lewis F. Ostrander, John J. Ostrander, William K. Richards and Frederick C. Stierlin, to deal in boilers, furnaces, etc., with a capital stock, fully paid, of $50,000.

The Interlocking Journal Bearing Co., New York City, has been incorporated by John J. Donovan, Thomas Hill Lowe and Noah A. Stancliffe, 165 Broadway, New York City. The company will manufacture equipment, supplies and devices for railways, cars and engines, with $100,000 capital stock.

Osborn, Rea & Co., New York City, has been incorporated with $10,000 capital, to manufacture heating and ventilating apparatus, pumps, engines, machinery and elevators. The incorporators are Charles T. Osborne, Charles R. Wright, 254 West 100th street, New York City, and Daniel R. Rea, 22 Fourth street, Elmhurst, N. Y.

The Victor Valve Co., Jersey City, N. J., has filed articles of incorporation to manufacture valves, pumps, indicators and injectors, with a capital of $500,000. Those interested are: Warren Hussey, 38 Broad street and John Fleming, 229 Broadway, both of New York City.

Grossman Bros. & Rosenbaum, the Bronx, New York City, has filed application for a charter to manufacture iron materials and construct buildings with an authorized capital of $24,000. The incorporators are: Samuel Grossman, 1038 Falls avenue; Ignatz Rosenbaum, 101 West 113th street; Martin Grossman, 552 Lenox avenue, all of New York City.

The United States Light & Heating Co., New York City, has been granted a charter to manufacture lamps, machinery and appliances for light and heat, with a capital of $10,000. The incorporators are: John L. Liuehan, 883 Longwood avenue; John Miller, 512 West 156th street, both of New York City, and Frederick Holman, 711 Seventh avenue, College Point, N. Y.

A charter to manufacture stamped metal and metal wares has been granted to the Eclipse Metal Stamping Co., New York City. The capital stock of the company is $4.000, and the incorporators are: Samuel J. Kelin, 586 Prospect avenue; Frederick L. Klein, 578 Prospect avenue, both of the Bronx, New York City, and Zigmund Israel, 208 East 109th street, New York City.

The General Machine Works, York, Pa., has been granted a certificate of incorporation, with $25,000 capital stock, to manufacture, repair, buy and sell all kinds of machinery. The company has these directors: A. R. Frantz, Geoffrey P. Yost, D. E. Small, Charles D. Moul, all of York, Pa., and Horace Brillinger, of Emigsville. Charles D. Moul is treasurer of the company.

A charter has been granted to the Schaap Flame Utilities Corporation, Brooklyn, N. Y., to manufacture burners to be used in welding and fusing metals, etc. with $30,000 capital stock. The incorporators are.: Alexander K. Schaap and Eva C. Schaap, 193 South Oxford street, Brooklyn, and Eugene L. DeVere, 533 West 124th street, New York City.

Articles of incorporation have been filed by the Jaeger Tungsten Lamp Co., New York, to manufacture tungsten lamps, electrical and illuminating appliances, etc., with $30,000 capital stock. Those interested are: William C. Lilieholm, 235 Fifth avenue, Brooklyn, N. Y., Cornelius S. Pinkney, 115 Broadway; Harry J. Robinson, 146 West 126th street; Jerome Wilzin, 16 West Ninetieth street, all of New York City.

General Industrial:—

The Skinner Mfg. Co., Canton, O., has increased its capital stock to $20,000 from $15.000.

The Parker Hoist & Machine Co., Chicago, has changed its name to the Parker Hoist & Derrick Co.

The capital stock of the Judge Machine Co., Baltimore, Md., has been increased from $25,000 to $75,000.

E. E. Southern Iron Co., Clayton, St. Louis county, Mo., has increased its capital stock from $60,000 to $100,000.

The Smith Mfg. Co., Bessemer, Ala., recently added a Newten cupola of 5 to 6 tons' hourly capacity to its plant.

The Des Moines Bridge & Iron Co., Des Moines, Ia., has been awarded the contract for the proposed Spirit Lake, Ia., waterworks system at the price of $19,791.42.

The Riverdale Iron & Steel Co. has increased its capital stock from $25.000 to $40,000, and has changed the location of its principal office from Chicago to Riverdale, Ill., a suburb of Chicago.

The Osborne High Pressure Joint & Valve Co., Chicago, advises that the increase of its capital stock recently was made for the purpose of adding to its working capacity.

Robert Wetherill Co.'s engine and boiler works, Chester, Pa., have been started on full time in all departments. Suspended orders for its product have been released since election.

The Bass Foundry & Machine Co., Fort Wayne, Ind., advises that the new building it is doing is merely an addition to one of its present shops,

and all the material, machinery, etc., will be supplied by itself.

The Jackson Mfg. Co., Harrisburg, Pa., recently received a large order for steel hand barrows from Argentina. A short time before a similar order was filled for Brazil.

The Joliet Bridge & Iron Works, Joliet, Ill., has been awarded the contract for supplying the city of Chicago with 1,000 tons of structural steel for the erection of the Carl Schurz school for $57,480.

Creditors of the Weber Foundry Co., bankrupt, Cincinnati, will soon receive a second and final dividend of 13 per cent, which has been declared by Referee Whittaker. The first dividend was 15 per cent.

The William J. Oliver Mfg. Co., Knoxville, Tenn., has purchased the Ground Hog Plow & Foundry Co., Clarkesville, Tenn., and will remove the stock, patterns, etc., to Knoxville, where the Oliver company will manufacture plows.

W. C. Ellston, Union City, and E. L. Murray, Bluffton, Ind., have sold their half interest in the Red Cross Mfg. Co., Bluffton, to J. A. Ullman, of that city, and G. A. Ullman, Ashland, O., who thereby become sole owners. The plant is a large manufacturer of pumps and windmills.

The Chase Rolling Mill Co., Waterbury, Conn., brass manufacturer, advises that its projected building, recently noted, is an addition to its plant which is made in the natural growth of business and in accordance with its general policy to provide facilities for it.

The Colorado Fuel & Iron Co. has added a night shift in its iron ore mines at Sunrise, Wyo., planning to increase the daily output to 5,000 tons, thus doubling the output which the property has made recently. This will make the total force employed in and about the mines 600 men.

The H. W. Cooper Saddlery Hardware Co., Moline, Ill., has awarded the contract for the building of the second furnace and four new ovens, trebling the capacity of the foundry. It is planned to have the new ovens ready for use in January, when the working force will be doubled to 150 men.

Charles P. Outhwaite has been appointed receiver for the Capitol Lock Nut & Washer Co., Columbus, O., after suit had been filed by Allen M. Foster to collect on the $20,000 note of the company which he says he indorsed as surety. The receiver was given authority to sell the property of the concern, applying the proceeds to the debts.

The Beloit Iron Works, Beloit, Wis., is completing a paper making machine for a Peoria, Ill., mill, the total weight of which is 350 tons and the length 350 feet. The machine has a triple deck of driers 44 x 114 feet. It is one of the largest machines that the Beloit Iron Works has ever made, being the second machine from this shop for the Peoria mills.

M. A. Ryan, Inc., 1123 Broadway, New York City, advises that the corporation intends rather to be contractor than manufacturer, but has found it convenient to manufacture some of the material to be used in the construction of various structures, such as iron-clad doors, structural iron, etc. For this work it is fully equipped, but does not intend to make that line of work its business.

A number of Toledo business men, among whom are mentioned B. F. Taylor, J. F. Grosweiler and Alexander Backus, are planning the organization of a new company to take over the property of the D. D. Flanner Co., Toledo, which went into the hands of a receiver last May. The company manufactures tube boilers for both marine and domestic use. W. F. McGuire has been operating the plant as receiver.

The waterworks committee of the city council of Augusta, Ga., has awarded the contract for an engine and pump to the Wilson-Snyder Co., Pittsburg, for $10,825, and for the boilers to the Lombard Iron Works, Augusta, Ga., for $3,388. The competition was lively, and the bids on the pump ranged from $10,000 to $35,000. The new pump will have a capacity of 6,000,000 gallons a day, and will be installed as soon as the new building can be constructed.

An amendment to the corporation papers of the Kelley-Taneyhill Co. has been filed, changing the name to the Armstrong-Quam Mfg. Co., Waterloo, Ia. J. E. Armstrong is manager of the new company. The capital stock has been increased to $100,000, double the former capital stock. Both Mr. Armstrong and Mr. Quam are St. Louis business men. New machinery is being added, and the company will increase the output of the factory, adding gasoline engines to its line of manufacture in addition to well drilling equipment.

The Lebanon Valley Iron Co., Lebanon, Pa., merchant bar, muck and scrap bar, advises that its new building will be 60 x 260 feet. It has purchased a roll train, including four sets of three-high housings and rolls, and a 24 x 48 Hamilton-Corliss engine to drive the train. Orders have been placed for two boilers which will be fired by waste fuel. Little more mill equipment is needed, except possibly shears for cutting scrap iron and steel, belting, some shafting and pulleys. The output of this mill will be about 60 tons every 24 hours.

The Maryland Steel Co. recently cast a fly wheel 24 feet in diameter, weighing 105,000 pounds, for one of the blowing engines it is building for its blast furnace department.

Two decrees of foreclosure against the Norwalk Steel & Iron Co., Norwalk, O., have been entered by the federal court at Toledo, in the case of Arthur Clark against the company and others. D. J. Young, of Norwalk, was appointed special master to make the sale of the mortgaged property located at Norwalk. These suits do not involve the plants of the American Iron & Steel Co., a consolidation of the Norwalk company and the William Kavanaugh Co. Among the assets involved, however, are 200 acres of land near Norwalk, and bonds of the new company.

The Erie Railroad Co. has practically completed the purchase of 10 acres of land adjoining its tracks at Hornell, N. Y., on which it is proposed to erect car shops and relieve the pressure on the shops at Buffalo. The work of construction, it is planned, will begin early in the spring in order to have the shops ready by next fall. Repair work will be done as formerly at Buffalo for the western division, but repairing and construction for the eastern divisions will be done at the Hornell shops.

The Champion Shoe Machinery Co., St. Louis, advises respecting its new building plans that it is breaking ground for a concrete and brick building, 155 feet front, on Forest Park boulevard, and running back 182 feet. Additional stories can be added whenever needed, according to construction plans. The roof will be of the latest design saw-tooth pattern affording ample light, and the plant will be equipped with most modern machinery for the manufacture of wax thread sole and harness stitching machines and sole nailing machines and a complete line of shoe finishing machinery. In spite of the recent depression, the company's business has increased steadily and has forced it

from its present quarters to the new plant, which will have four times its present capacity. The company is employing 125 men, and for a number of months has been behind on orders.

The N. S. Sherman Machine & Iron Works, Oklahoma City, Okla., has been awarded the contract for the construction of a water works with a daily capacity of 1,000,000 gallons at Teague, Tex., to cost $50,000.

Strikers at the plant of the South Baltimore Steel & Foundry Works, Baltimore, Md., were enjoined Nov. 24 from intimidation and molestation of employes, this action being taken by the receivers who charged that the strikers and their sympathizers had "insulted and threatened and otherwise intimidated" a number of persons from returning to work.

Several notable examples of the wearing qualities of the Schoen steel car wheel were exhibited by the Carnegie Steel Co. at the convention of the American Street & Interurban Railway Association recently held at Atlantic City. In street car service wheels were shown which had withstood 240,000 miles of travel. There were also exhibited steam railway wheels which had recorded 10,000 miles of service per 1/16-inch of wear and wheels which had run 20,000 miles in freight car service. The Carnegie Steel Co. has just issued a 46-page catalog illustrating these wheels.

The plant at West street and Pierce alley, Pittsburg, recently sold to Edwin C. Carrington Jr., an attorney of that city, was not the property of the Otis Elevator Co., as stated in THE IRON TRADE REVIEW of Nov. 26. The Otis Elevator Co. never occupied the premises mentioned, as its offices, stock rooms and machine shop were located for five years at 1016 Penn avenue. About June 1 of this year, the offices were moved to the new Keenan building, corner of Liberty avenue and Seventh street, and the new stock rooms and machine shop were erected in the rear of the Keenan building.

At a recent meeting of the board of directors of the Union Foundry Co., Anniston, Ala., the report of General Manager Gerard Schumacher was presented, showing that during the last six months the capacity of the plant had increased by 50 per cent, doubling the output during the past year and more than doubling its sales. The directors made a tour of inspection, especially of the addition just completed to the plant made on a tract of 10½ acres given by the city of Anniston. It is announced that the orders received by the company warrant adding to the output every month until the maximum capacity is reached, possibly on May 1.

Fires:—

The Carlisle Chain Works, Carlisle, Pa., was damaged Nov. 26 by fire, the damage being $2,000, fully covered by insurance.

The plant of the Detroit Saw & Tool Works, and Burr's Damascus Tool Works, Detroit, both operated by one company, were damaged Nov. 27 by fire, the loss being placed at $8,000.

The plant of the Straub Machinery Co., Cincinnati, was seriously threatened by fire Dec. 3, which caused about $2,000 damage. The fire started in the millwright department.

The passenger car shops of the Rhodes Curry Co., Amherst, N. S., were badly damaged by fire Nov. 24, the loss reaching about $100,000. A considerable amount of rolling stock and equipment were burned also.

The foundry, pattern shop and patterns of the Prescott Iron Works, Prescott, Ariz., were badly damaged by fire Nov. 26. The loss was about $40,000, with no insurance. The company advises that it will rebuild at once and will be casting in its temporary foundry within 10 days.

The roof and boiler room of the Rogers Iron Mfg. Co., Muskegon, Mich., were damaged to the extent of about $800 on Nov. 23.

TRADE PUBLICATIONS.

AIR COMPRESSORS.—The Bury Compressor Co., Erie, Pa., is distributing catalog No. 42, describing a line of air compressors, which includes both steam and belt-driven machines, of both the single and multi-stage type. Catalog No. 41, which is included in the same cover, describes duplex air compressors, both steam and belt-driven. The single-stage compressors range in capacity from 17 to 400 cubic feet per minute, while the duplex machines range from 78 to 2,440 cubic feet of free air per minute.

SCREENING MACHINERY.—C. O. Bartlett & Snow Co., Cleveland, are distributing catalog No. 27, describing screening machinery, and including grading reels of the Triumph type, wire cloth, bolting screens and reels, reel spiders, etc. Illustrations of actual installation of the various lines of machinery are included in the catalog.

BOILER FEED REGULATORS.—The American Boiler Economy Co., Philadelphia, Pa., is distributing a 32-page catalog, describing the Copes boiler feed regulator and the Copes pump governor. The catalog contains a treatise setting forth the benefits to be secured by exact regulation of the feed water, the danger of low water and irregular feeding, the dangers of high water and the influence of the regulator under discussion on the superheater. It describes and presents illustrations of actual installation and describes the mechanism of the device. The catalog also describes the mechanism and the action of the Copes pump governor, which was originally designed as an accessory to the boiler feed regulator, but which is adapted to other uses for which a pump governor is necessary.

CRUSHERS.—Catalog No. 11, issued by the Pennsylvania Crusher Co., Philadelphia, describes a line of hammer crushers, Bradford cleaners, rotary crushers, rock crushers and magnetic separators, built by the above company. Illustrations showing both the exterior and interior construction of the above lines, together with the specifications and tables of dimensions, are incorporated. The crushers are suitable for pulverizing coke, coal, limestone, phosphate, shale, gypsum, paint ores, clay, lime, oyster shells, etc. They are heavily built and designed to withstand the most severe service.

HOISTING EQUIPMENT.—Bulletins 2 to 5, inclusive, issued by Victor R. Browning & Co., Cleveland, describe respectively overhead traveling cranes, Armington hoists, double cylinder and double drum hoisting engines, and standard double drum hoisting engines, derricks, winches and elevators for compressor use. The cranes are of the three-motor type and are equipped with automatic electric brakes, and with mechanical brakes. The hoists are built in capacities from one to 10 tons and have a single point suspension. The hoisting engines are built in capacities from 2,000 to 12,000 pounds lift.

REMOTE CONTROL SWITCHES.—The Pettingell-Andrews Co., Boston, Mass., describes the P-M remote control switch for the simplification of wire systems in a 16-page catalog, just issued. This switch has been designed to simplify the control of large currents of electricity, and to enable any one to control lights from various points without the necessity of bringing the service wires to those points, and to effect a direct saving in first cost of installation and consumption of current. The switch is magnetically operated and controlled by contact switches located in as many points as desired.

PIPE FITTINGS.—The Central Foundry Co., New York City, has issued two bulletins giving weights, dimensions and working pressures of redesigned universal cast iron pipe for water and gas mains, high pressure fire service, suction lines, etc. The range comprised in the catalog is from 2 to 20-inch pipe. The second bulletin is a price list of universal fittings and presents principally the improvements made in the design of these fittings.

ELECTRICAL MACHINERY.—The Crocker-Wheeler Co., Ampere, N. J., has issued bulletins 106, 107, 108 and 109, describing respectively direct-current switchboard panels, direct-current lighting and power generators, engine type alternating-current generators, and generating sets with direct-connected engines. The switchboard panels are built for 125 to 250 volts and are made in a number of different forms applicable to various services of light and power. The direct-connected light and power generators are built in capacities ranging from 200 to 1,200 kilowatts. Specifications and illustrations are presented in the bulletin, together with tables of principal dimensions. The engine type alternating-current type generators are described and illustrated, and in addition some general alternating-current information is presented. Bulletin No. 109 describes generator sets of from two to 19 kilowatts capacity for direct current.